

# AMERICAN ARTISAN

WARM AIR HEATING • AIR CONDITIONING  
SHEET METAL CONTRACTING

AIR  
CONDITIONING  
SECTION

PAGE 73

ESTABLISHED  
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JANUARY  
1938

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1938





## THE *Vanguard* OF PROGRESS

### KEEP YOURSELF IN FRONT WITH LAMNECK PREFABRICATED DUCT

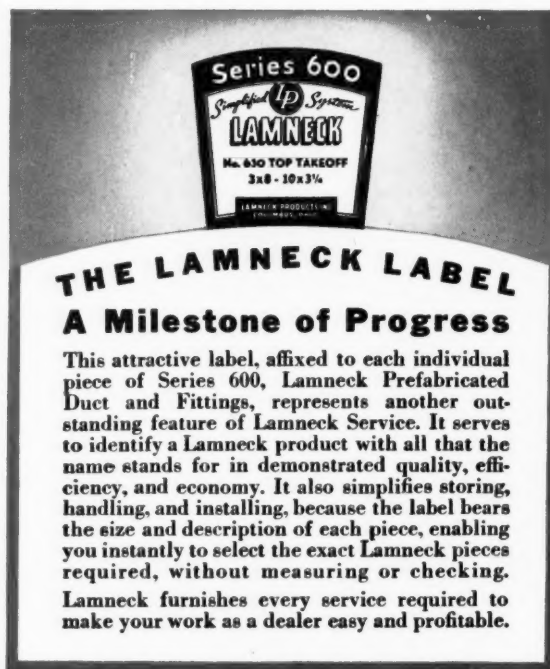
A dealer is known by the type of air conditioning unit he handles. In no less measure does his reputation depend on the kind of duct he installs.

It must be in keeping with the quality and advanced development represented by the unit itself. It must embody modern principles of design and perfected workmanship that insure maximum efficiency, dependability, and style.

Lamneck Prefabricated Duct, Series 600, is as far advanced over the hand-fabricated product as the modern air conditioning unit is over the furnace of the more or less gay 'nineties. Not only is it neat, attractive, rigid, and substantial, but it is so simple and flexible that it makes installation cost surprisingly less than with hand-fabricated duct.

To the progressive dealer, the use of Lamneck Prefabricated Duct, Series 600, represents sound, present-day merchandising practice, free from the guesswork, worry,

and doubtful profits of hand-fabrication. It keeps him in front of the present day parade of progress in the air conditioning field—a real representative of the latest and best that the industry produces.



*We'll meet you at the Lamneck Exhibit, Space 260, International Heating & Ventilating Exposition, Grand Central Palace, New York City, January 24 to 28, 1938.*

**LAMNECK PRODUCTS, INC.**  
414 DUBLIN AVENUE • COLUMBUS, OHIO

PREFABRICATED DUCT AND FITTINGS FOR  
FORCED AIR AND AIR CONDITIONING SYSTEMS

EMCN. 3/10/39



# Everything

## FOR WINTER AIR CONDITIONING

About the only shopping done by many sheet metal, heating and air conditioning men is for gifts at holiday time. Instead of searching here, there and everywhere to find the best materials for a job, they look to Osborn for them. After all, that is a valuable part of our service to the trade.

Take heating and winter air conditioning materials and equipment for example. The adjoining list shows only a part of the many items we carry. It takes time . . . and lots of it . . . to select the leading make in each of these lines . . . time which is well spent when you serve thousands of steady customers.

Would you like to save the bother and expense of shopping for materials? The Osborn salesman, who calls regularly in your city, can help you. So can the Osborn No. 37 Stock List. Both are at your service for the asking.

FLAT SHEETS  
(all metals and gauges)  
FURNACES, CAST IRON  
FURNACES, STEEL  
(coal, gas or oil)  
BLOWERS AND FANS  
FILTERS, AIR  
AUTOMATIC REGULATORS  
AND CONTROLS  
HUMIDIFIERS, AUTOMATIC  
STOKERS  
FURNACE PIPE & FITTINGS  
(air conditioning)  
(gravity)  
REGISTERS  
(air conditioning)  
(gravity)  
COLD AIR FACES  
DAMPERS, CHECK  
DAMPERS, HOT AIR  
DAMPER REGULATORS  
FURNACE COILS  
FURNACE CEMENT  
INSULATION  
ASBESTOS PAPER  
PASTE FLOUR  
ASBESTOS MILLBOARD  
FURNACE CHAIN  
FURNACE PULLEYS  
FURNACE BRUSHES  
VACUUM CLEANERS  
SHEET METAL SCREWS  
RIVETS AND BOLTS  
ALL TYPES OF HAND,  
BENCH AND POWER  
TOOLS AND MACHINERY

THE J. M. & L. A.  
**OSBORN Co**  
Manufacturers—Distributors  
BUFFALO · CLEVELAND · DETROIT  
Metals and Metal Products

A DEPENDABLE SOURCE  
OF SUPPLY FOR 79 YEARS

EMCN. 3/10/39

## In This Issue

It is with much regret that we forego, in this January issue, American Artisan's annual survey of business. Despite a thorough canvass of conditions, production or sales figures which will stand up under final tabulation are not now available.

★  
The outstanding architectural sheet metal contract of 1937, we believe, is the enormous copper roof on the Agricultural Center of Louisiana State University. The engineer who handled this job explains on page 44 how 140,000 pounds of copper were formed and placed.

★  
So much interest is developing in heating codes and licensing that a survey of the country was made in 1937. Every possible code was obtained and from these codes the important provisions were tabulated as shown on page 48.

★  
Most interesting—and highly instructive, too—are the profit and loss records of Philadelphia shops explained by B. F. John and Fred U. Ritter on page 54. Compare your operations with a shop of your size and see if you did better or worse.

★  
And J. G. Dingle brings to a climax his series with an article on page 58 explaining and showing the actual journals and ledgers required to do bookkeeping according to 1938's requirements.

★  
Once again we present a preview of the air conditioning show in New York City, January 24-28. Also the program of the N. W. A. H. & A. C. Assn., the same place and date, and list the products to be exhibited, by whom and where. See the special section, page 65.

★  
Most pleased, we are, to begin publication on page 109 of a series of articles by G. A. Voorhees who suggests a new Precalculated Engineering method to save your time. Space does not permit explanation, but every reader will want to study this method.

★  
On page 116 we lay the ghost of condensation in walls. Read the article by L. V. Teesdale. And to round out humidification, we publish the first of a series to cover basic data by Professor L. G. Miller on page 120. The author is, we think, one of the country's best qualified authorities on this touchy subject.

★  
With engineering becoming a matter of care with details you will want to know how much friction there is in an elbow, an angle, a box, etc. S. Konzo, with data gathered from many sources, gives a complete tabulation of fitting frictions on page 122.

★  
And to add something to the controversy over relative merits of furnace vs. attic ventilating fans, G. B. Helmrich, on page 132, supplies complete records for summer cooling in several Detroit houses.

# AMERICAN ARTISAN

With which is merged

**FURNACES  
AND  
SHEET METALS**

AND

**Warm-Air  
Heating**

Covering All Activities in

Gravity Warm Air Heating      Forced Warm Air Heating  
Sheet Metal Contracting      Ventilating  
Air Conditioning

J. D. Wilder, Editor

A. A. Kennedy, Assistant Editor

Brewster S. Beach, Consulting Editor

Vol. 107, No. 1

January, 1938

Founded 1880

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## THE AIR CONDITIONING SECTION

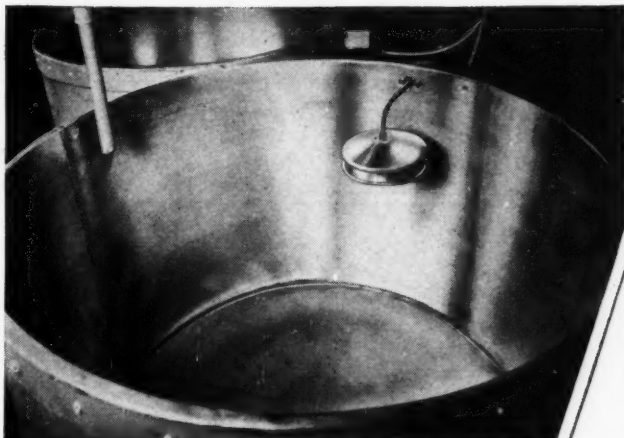
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**More than 8,000 Copies of this Issue are being distributed**



Close-up view showing interior of Monel maple syrup cooking and storage kettles. There are four kettles (shown below) all Monel-lined, 48" dia. x 36" high.

*This tough, corrosion-resistant metal is preferred for many kinds of food processing equipment.*

**N**EVER pass up a Cannery or Food Processing Plant. As you'll see by these photographs, not one but many places exist where tanks, chutes, hoods, tables, bins, hoppers, utensils, etc., need replacing and new ones added. These jobs are profitable, and will often come your way—if you only suggest Monel.\* For this reason:

Monel, as you know, is strong, tough, corrosion-resistant, and therefore long-lived—economical to use. But your smart Food Plant or Cannery executive demands something more. He demands a metal that not only resists the corrosive effects of food products—but which does not contaminate his product.

Right there is your opportunity: For Monel, long famed for protecting pure foods, is extensively used for food processing, handling and packaging equipment of all kinds. Monel, furthermore, is advertised in leading Food Industry publications month after month the year 'round. So your prospects know Monel.

You've merely to suggest it in sheet metal form for such additional applications as tanks, pails, vats, trays and other utensils.

Next time you're near a Food Plant or Cannery, don't pass it by—step inside. Suggest to the superintendent additional uses for Monel that haven't occurred to him. Write for further information, and for complete working instructions. Address:

**THE INTERNATIONAL NICKEL COMPANY, INC.**  
67 WALL STREET NEW YORK, N. Y.

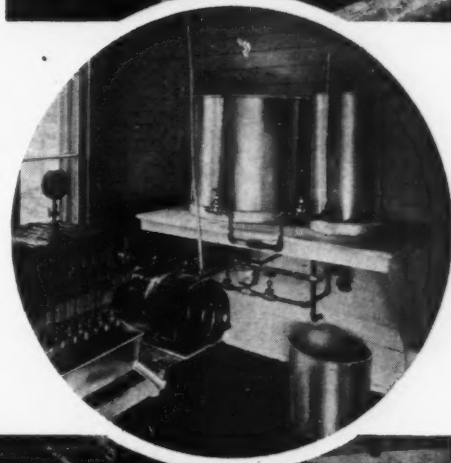
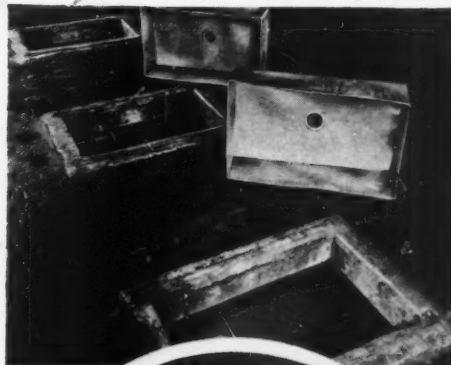
\*Monel is a registered trade-mark applied to an alloy containing approximately two-thirds Nickel and one-third copper. This alloy is mined, smelted, refined, rolled and marketed solely by International Nickel.



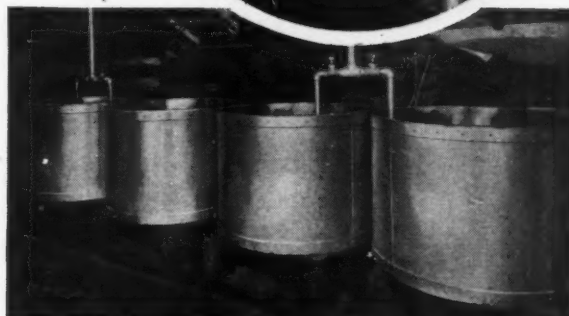
Before you  
Go Hungry for  
**JOBS**  
try selling  
**MONEL**  
to the  
**FOOD PLANTS**

(Below) Monel receiving tanks, three in all, 40" x 40" x 96" are set below the floor level. The removable trays are also made of Monel.

(Below, inset) View showing corner of the experimental filtration laboratory. Holding tanks, draw-off tank and filter trays are all of Monel.



Exterior plant view of The Maple Sugar Producers of Quebec, Plessisville, Quebec, Canada. Equipped with Monel storage tanks, processing tanks, filters, utensils, etc.



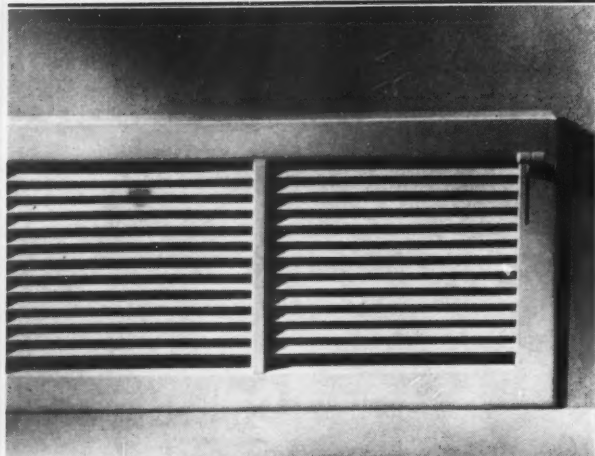
A nice job for any sheet metal worker—four Monel-lined cooking and storage kettles 48" dia. x 36" with Monel heating coils and floats.



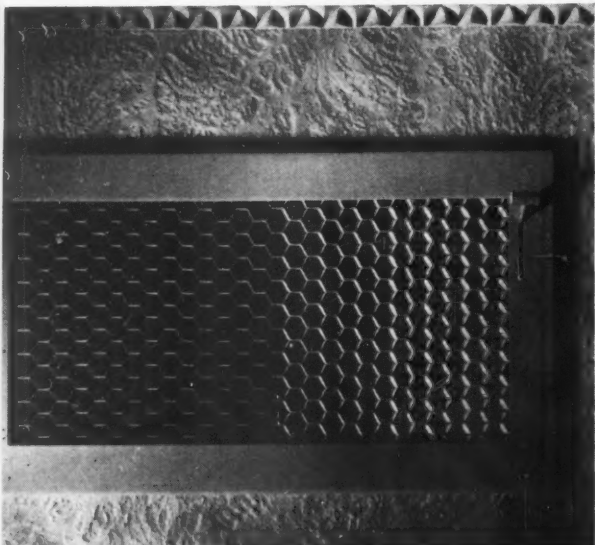


*Air Conditioning  
Grilles and Registers from*

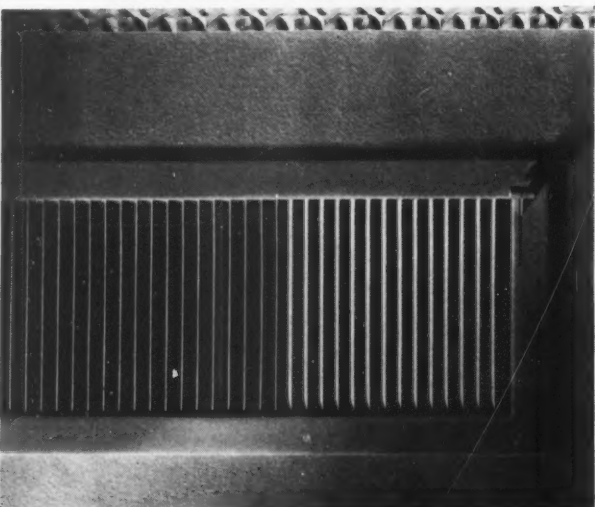
# *The QUALITY Line*



NO. 85 DESIGN



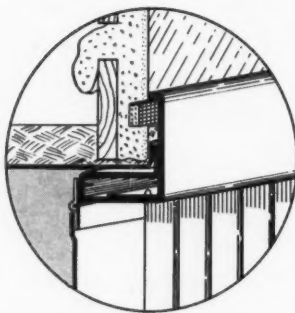
NO. 90 DESIGN



NO. 84 DESIGN

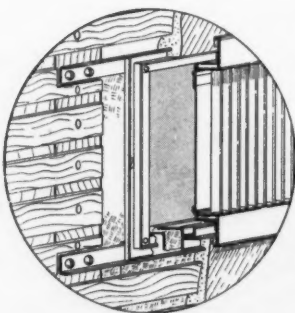
**S**HOWN at the left are three of the eight distinctive grille designs included in the H & C line; all available in a choice of six installation frames. If you are not thoroughly acquainted with these grilles and registers and the ideal way they fit into every installation requirement, by all means, inspect them thoroughly at your Jobbers' or write for samples. They're carefully engineered to give maximum results under all conditions; pleasing in appearance and built to the high standards that have always identified H & C as the Quality line.

No. 37 A.C. Air Conditioning Catalog sent on request.



### **Sponge Rubber Gasket Now Standard Without Extra Charge**

By preventing all air leakage, discoloration of walls is eliminated.



### **3-Piece Frame Assures Ideal Installation**

Forms a solid foundation for Register—stackhead is held securely in place, eliminating possibility of interference with valve — plaster lock prevents plaster breaking away from frame—face overlaps frame  $\frac{1}{4}$ ", concealing joint between plaster and frame—sponge rubber gasket prevents streaking.

**HART & COOLEY MANUFACTURING CO.**

*Warm Air Registers  
Damper Regulator Sets*



*Air Conditioning Grilles  
Dampers, Chain, Pulleys*

**61 W. KINZIE STREET, CHICAGO, ILLINOIS**  
ENGINEERING OFFICE AND FACTORY • HOLLAND • MICH.



## Certification Assures Workability & Prime Quality

Ryerson Certified Steels represent the highest quality obtainable in each class and type of material. Stocks include more than 25 different kinds of sheets and all other steel products used by the sheet metal worker.

Ryerson sheets are all prime quality, accurate to gauge and size and selected for finish, flatness, and workability. They are all kept in

heated air conditioned warehouses to preserve their inherent qualities.

Ryerson bands, angles, channels, etc. are also uniform high quality steels. When you need good steel, order from the nearest Ryerson plant. Immediate Shipment is assured.

Joseph T. Ryerson & Son, Inc. Plants at: Chicago, Milwaukee, St. Louis, Cincinnati, Detroit, Cleveland, Buffalo, Boston, Philadelphia, Jersey City

# RYERSON

**RYERSON SHEETS  
INCLUDE:**

Allegheny Stainless  
Blue Annealed  
Copper Alloy  
Corrugated  
Deep Drawing

Galvanized  
Panel and Sign  
Galvannealed  
Heavy Hot Rolled  
Long Terme

Stretcher Levelled  
Uniform Blue  
Vitreous Enameling  
Wellsville Polished  
and Many Others.

*Certified*

# STEELS

# LEADERSHIP

## IN 1938

### *Goes with*



FOR OIL — Sunbeam Air Conditioner, Series No. 200, available with or without gun-type oil burner. Also available is the Series No. 700 with integral rotary wall flame oil burner completely assembled at factory. Capacities range from 50,000 to 331,000 BTU at register.



FOR COAL — Sunbeam Air Conditioner, Series No. 80, with steel heating element. Also available are 3 other types including Series "S" designed for stoker-firing exclusively. Capacities range from 76,000 to 222,000 BTU at register.

**6 REASONS WHY  
MORE HEATING CONTRACTORS  
SELL SUNBEAM  
HAN ANY OTHER MAKE**

**1 THE MOST COMPLETE LINE**

8 series of air conditioners and 4 furnace series (both cast-iron and steel) — 126 types and sizes — enable you to supply the right type and capacity for each customer . . . no matter how large or small his house . . . whether he uses coal, oil or gas . . . whether he desires a de luxe or economically priced unit.

**2 LOW PRICES**

Prices on Sunbeam Units meet any competitive bidding . . . and still contain a greater profit margin for you. Dollar for dollar no competitor can match the many additional features you can offer prospects with your Sunbeam Line.

# THE FOX FURNACE COMPANY

ELYRIA, OHIO, a Division of American Radiator and Standard Sanitary Corporation

# SUN

**WARM  
... AIR**

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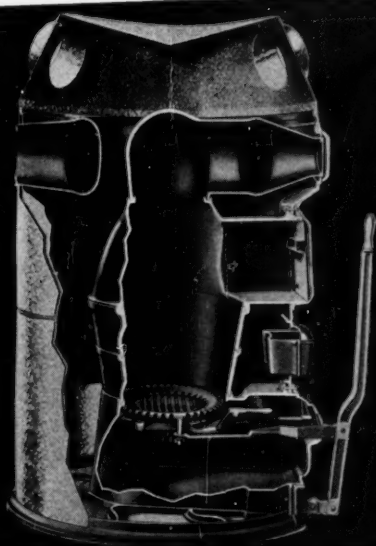
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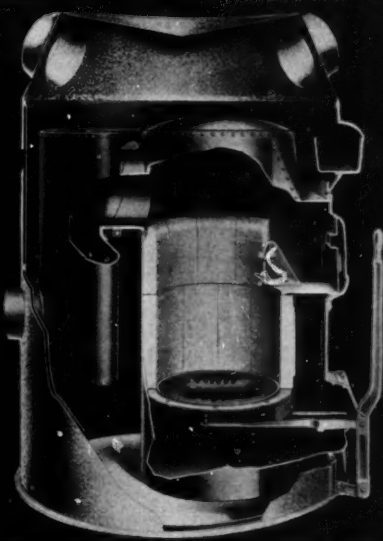


# SUNBEAM

## M AIR FURNACES AND R CONDITIONING UNITS



**SUNBEAM CAST-IRON FURNACE** — 7 sizes from 18" to 30" diameter fire pots — pipe and pipeless styles. Has one-piece radiator, slip-on fronts, duplex grates, one-piece base, and machine-molded castings of uniform strength.



**SUNBEAM STEEL FURNACE** — Series No. 500 — Riveted and welded for long life and leak-proof construction... a quality furnace at a low price. Also available is the unexcelled Series No. 8000 steel furnace. Sizes range from 20" to 34".



**FOR GAS** — Sunbeam Air Conditioner, Series D, with cast-iron heating element—all valves, wiring and piping concealed. Also available is the low priced Series "M", with steel heating elements, and Series "O" gravity furnace.

### 3 EASY FINANCE PLAN

Sunbeam's easy payment plan makes possible many extra sales for Sunbeam dealers. You get your money as soon as the job is finished. Customer can spread payments over a long period of time — with installments as low as \$10.00 per month.

### 4 CONVENIENT STOCKS

Warehouse stocks in 150 key cities offer immediate delivery on all furnaces. There is no waiting for shipments from a distant factory... no need for your money to be tied up in any slow moving sizes when you sell the Sunbeam Line.

### 5 NATIONAL ADVERTISING

Millions of Sunbeam advertisements scheduled in influential magazines will tell your Sunbeam story to hundreds and thousands of home owners and buyers right in your own home town. Be ready to profit from these Sunbeam-sold prospects.

### 6 SUNBEAM'S 50 YEARS OF HEATING EXPERIENCE

Sunbeam's half-century leadership in research and the manufacture of warm air heating equipment guarantees time-proved construction... less service troubles... greater net profits to thousands of successful dealers selling Sunbeam.

### DON'T MISS THE *Sunbeam Schools*

In approximately 100 different cities Sunbeam jobbers will conduct air conditioning engineering schools with Fox Furnace experts co-operating. Schools will be in session during the winter and early spring months of 1938. Return the coupon below for information on the school in or near your city.

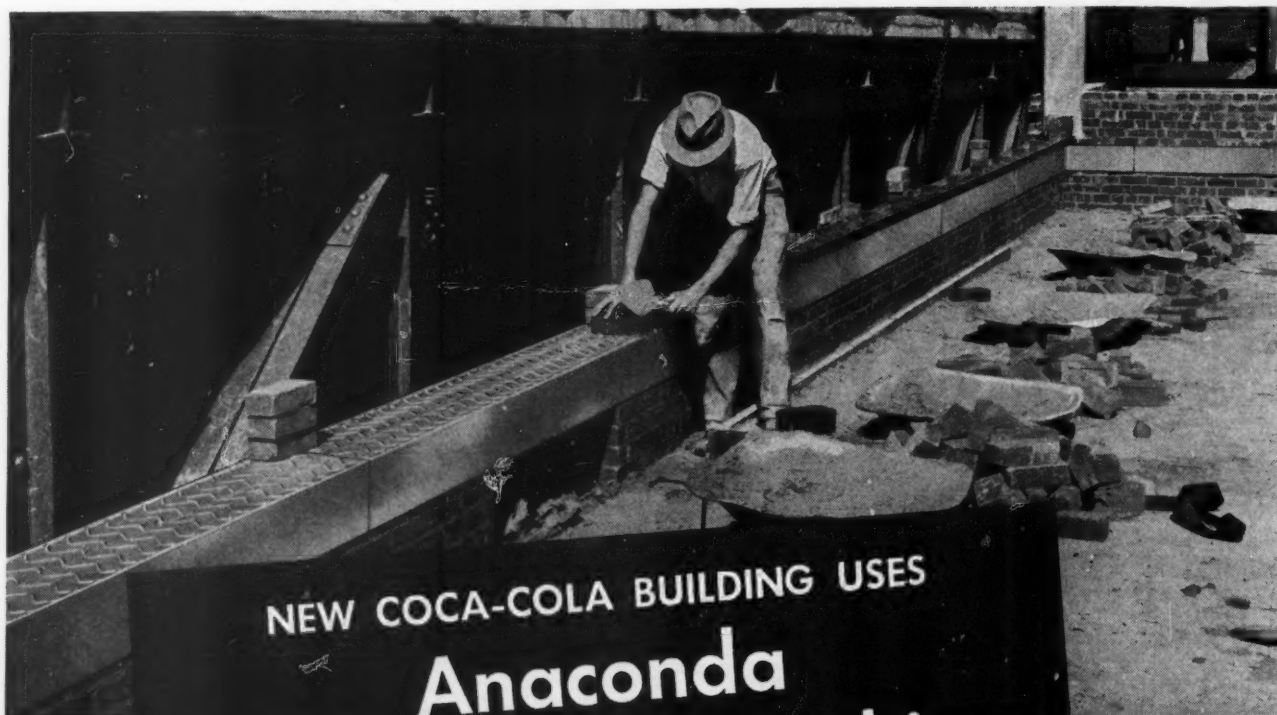
**SUNBEAM** will  
help you to greater  
profits in 1938

- ☐ Show me why I should carry the Sunbeam Line in 1938.
- ☐ Please give me details on the Sunbeam Air Conditioning Engineering Schools to be held near my city.

Name \_\_\_\_\_  
Address \_\_\_\_\_  
City \_\_\_\_\_ State \_\_\_\_\_

AA-1-38

**YOUR FIRST MOVE  
IS TO SEND FOR THE  
Complete SUNBEAM  
STORY FOR 1938**



## NEW COCA-COLA BUILDING USES Anaconda Through-Wall Flashing

Jesse M. Shelton, Architect,  
Atlanta, Ga.

James Stewart & Co., Inc.,  
General Contractors, N. Y. C.

Efficient...positive...adaptable...durable and moderately priced

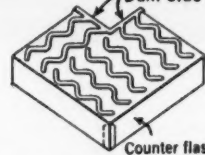
IN THE construction of the Coca-Cola Syrup Factory at Kearny, N. J., 7000 pounds of Anaconda Through-Wall Flashing\* were used for the 12" walls. This type of flashing was selected because of its unique design. An integral dam throughout its entire length gives thorough drainage in the desired direction. A series of zig-zag corrugations of the same height as the dam prevents lateral movement in any direction.

Anaconda Through-Wall Flashing is easily locked endwise, simply by nesting one or two corrugations. Made of 16-ounce Anaconda Copper, either plain or lead coated, these flashings are available in 5' or 8' lengths in a range of standard and special widths, and with various selvages. Publication C-28 describes and illustrates Anaconda Through-Wall Flashing in detail. A copy will be mailed on request.

One-piece inside and outside corner flashings are now available for both 8" and 12" walls. They are so designed that the corrugations will interlock with those of adjoining straight flashings, thus providing the same thorough flashing at the corners as on the wall.

\*Pat. No. 1,906,674

INSIDE CORNER FLASHING  
Dam side



Standard inside corner flashing unit. Dam on inside, drains out.

OUTSIDE CORNER FLASHING  
Dam side



Standard outside corner flashing unit. Dam on outside, drains in.



# Anaconda Copper

THE AMERICAN BRASS COMPANY · GENERAL OFFICES: WATERBURY, CONNECTICUT  
Offices and Sales Agencies in Principal Cities · In Canada: ANACONDA AMERICAN BRASS LTD., New Toronto, Ontario



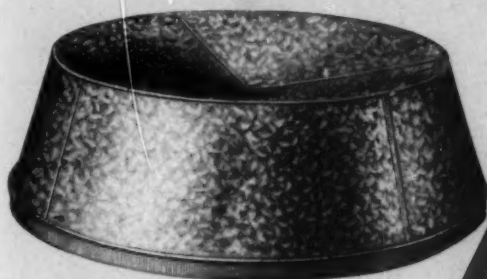
# F. MEYER & BRO. CO.

## HANDY PIPE

PEORIA . . . ILLINOIS



OUR  
PRE-FABRICATED  
DUCT-WORK FOR  
FORCED-AIR-  
CONDITIONING  
SAVES TIME  
LABOR, INCREASES PROFIT,  
INSURES GRATIFYING PERFORMANCE



FURNACE BONNETS



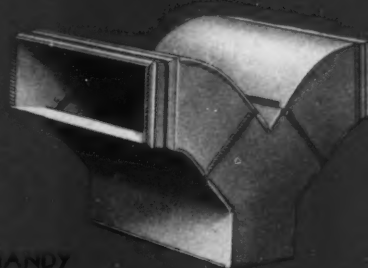
COLD AIR PIPE



FRICTIONLESS DESIGN



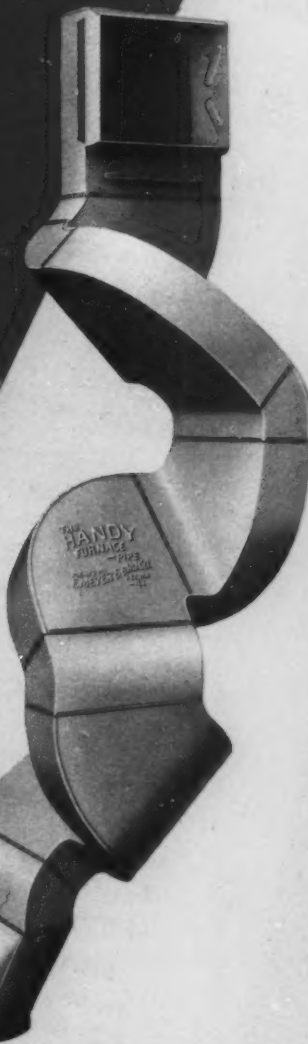
EVERY SIZE WANTED



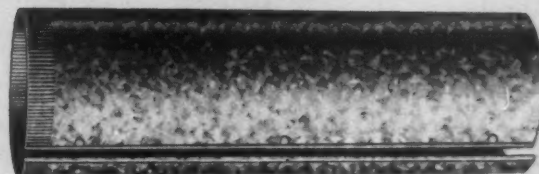
HANDY  
PIPE



ELBOWS  
ALL KINDS  
AND SIZES



WALL  
STACKS



PIPE FOR ALL NEEDS

Handy pipe and fittings have "set the pace" through the years. They were "the best to be had" in 1896—and they're "the best to be had" in 1938—whether you want standard fittings for your simplest job or pre-fabricated, specially designed duct-work for your most intricate forced, conditioned air contracts.

## HANDY PIPE

ALWAYS DEPENDABLE  
ALWAYS MODERN

Our Catalogue No. 50 "tells all" and is yours on request.

F. MEYER & BRO. CO. Peoria, Illinois

See us in booth ten at the International  
Heating and Ventilating Exposition



# FOR

# all

# FUELS

## A Complete RANGE OF PRICES AND SIZES . .

If you are the leading dealer in your community—or are going to be—you need the MEYER-WEIR Lines. You have a reputation to maintain. MEYER-WEIR equipment will never let you down!

MEYER-WEIR dealers are in an enviable position. They can "custom-fit" any heating installation whether it's for coal, oil or gas—whether it's an elaborate air conditioning installation or a simple competitive heating job. For every need there's MEYER-WEIR quality equipment that's proven in performance—that has a long and enviable record of Customer Satisfaction. In addition, MEYER-WEIR dealers get full factory cooperation and protection.

MEYER pioneered steel furnace construction. The WEIR RIVET-ED & WELDED Steel furnace

has over half a century of specialized, practical experience behind it. And remember—"There is no substitute for Experience". The Meyer reputation in the heating industry is your guarantee of heating and air conditioning equipment which is matchless in quality, in modern design and styling, in efficient performance.

1938 offers a big opportunity for heating and air conditioning sales. No matter what line you handle, you are sure to get some business—BUT with MEYER-WEIR, you can have the "lion's share" in your community.

The MEYER-WEIR proposition means PROFITS for you. Get the facts. Send the coupon.



"Who Makes It Makes a Difference"

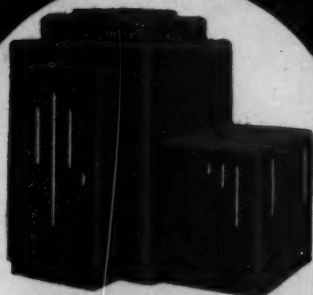
**THE MEYER FURNACE COMPANY**  
MANUFACTURERS OF  
WEIR AND MEYER STEEL FURNACES  
Domestic Air Conditioning Appliances  
PEORIA, ILLINOIS



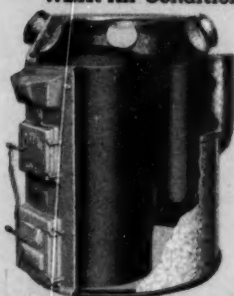
# WEIR MEYER



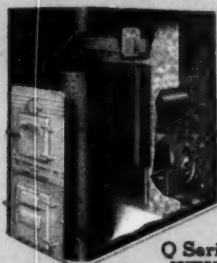
# S COAL-OIL-GAS



600 Series  
WEIR Air Conditioner



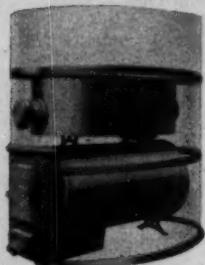
A Series  
WEIR Furnace



Q Series  
WEIR  
Air Conditioner



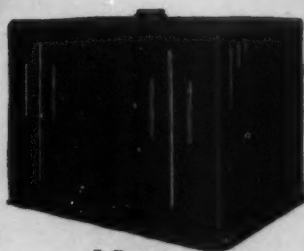
WEIR  
Cylindrical  
Radiator Furnace



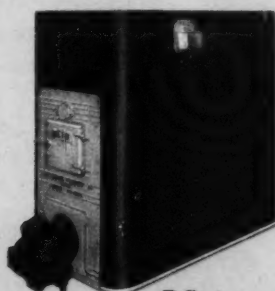
WEIR Wood Furnace



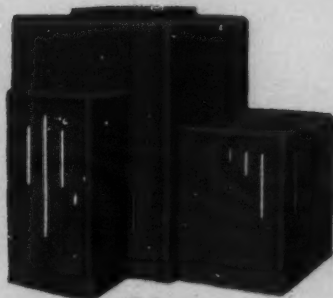
WEIR Stoker



A Series  
WEIR  
Oil-Fired Air Conditioner



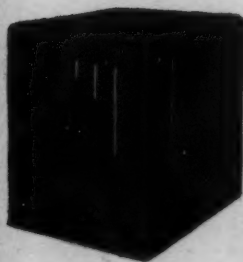
R Series  
WEIR  
Oil-Fired Air Conditioner



K Series  
WEIR  
Oil-Fired Air Conditioner



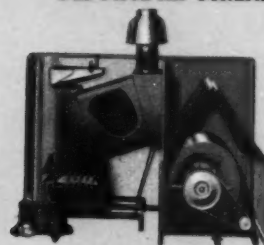
MEYER  
Oil Burner



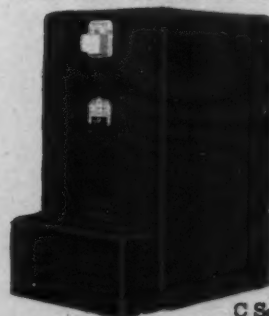
MEYER  
"Blo-Aire"



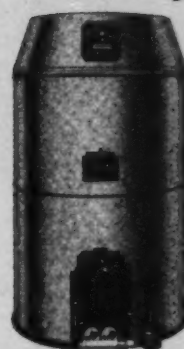
E Series  
MEYER  
Gas-Fired Air Conditioner



E Series  
MEYER  
Gas-Fired Air Conditioner



C Series  
MEYER  
Gas Furnace



D Series MEYER Gas Furnace

MAIL THIS COUPON *Today*

(Fill in or clip this coupon to your letterhead)

THE MEYER FURNACE CO.  
PEORIA, ILLINOIS

Please send complete facts about MEYER-WEIR Heating  
Equipment and Dealer Proposition.

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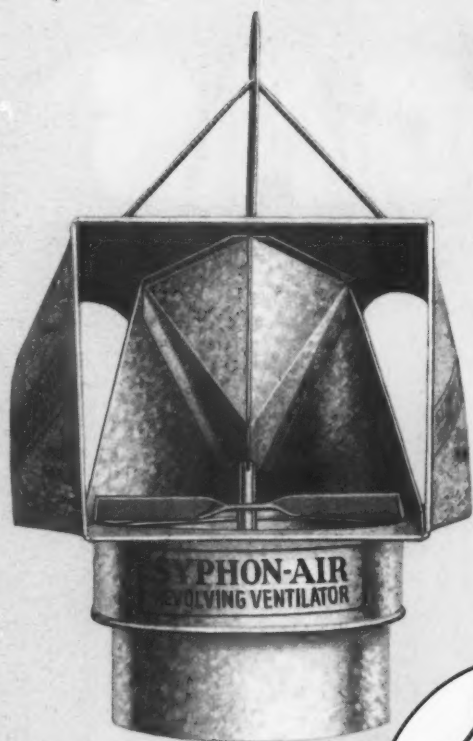


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# SYPHON-AIR Ventilators

INSURE BETTER VENTILATION

(and make you more money)

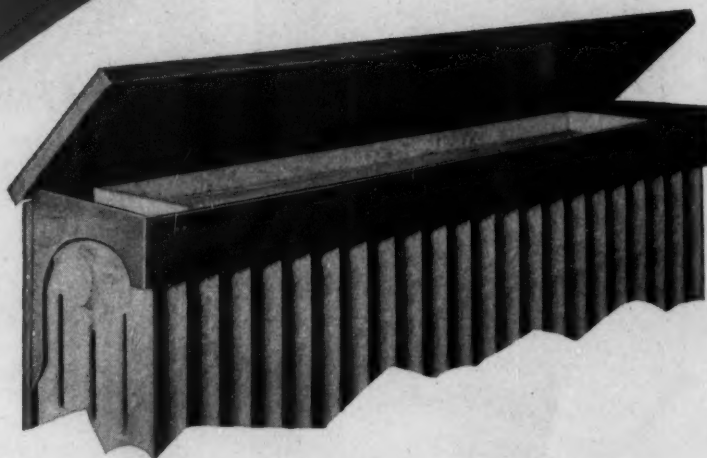


- Air-velocity is more important than size in determining the efficiency of a ventilator or a ventilating system—and "SYPHON-AIR" ventilators insure increased air-velocity by "sucking" or "syphoning" the air or gases out of the space below.
- Wind, blowing in at the back and out at the front of these improved ventilators does the job (the illustrations show how) and that means you do a better job—and your customers are better satisfied.
- Correctly designed for frictionless flow of air; made of Armco ingot iron and rotating on a rustless bronze ball bearing, it will give years of efficient service without attention.
- Have one on your floor so you can SHOW prospects how much better it is.

AND YOU CAN PROFIT FROM

*Radiator Shields  
and Enclosures, too!*

- We have a complete line—including this most-efficient humidifying unit. Sell this merchandise to homes that are seeking better air and cleaner walls—and better appearance!



- "Everything for the Installation of Warm Air and Air-Conditioning Jobs." Our Catalogue No. 50 is free on request.

**F. MEYER & BRO. CO.**  
PEORIA, ILLINOIS



# TALK ABOUT *Workability!*



## MACHINABILITY

With our free-machining stainless steels (U·S·S 18-8 and U·S·S 12 FM) automatic screw machines can machine any pattern which can be machined from ordinary Bessemer screw stock.

## WELDABILITY

U·S·S Stainless Steel can be neatly welded with either flame or electric equipment. For applications involving severe corrosion, use U·S·S 18-8 Stabilized, which can be welded with absolutely no loss of corrosion-resistance.

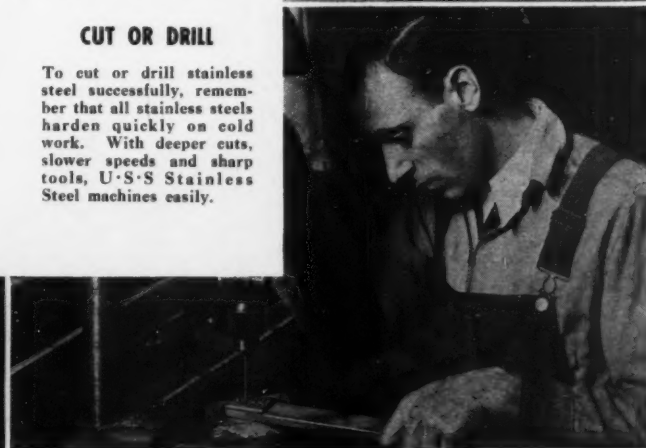


## DEEP DRAWS

U·S·S Stainless Steel is one of the most ductile of all metals, thus making possible new designs drawn to amazing depths in a single operation.

## CUT OR DRILL

To cut or drill stainless steel successfully, remember that all stainless steels harden quickly on cold work. With deeper cuts, slower speeds and sharp tools, U·S·S Stainless Steel machines easily.



**T**WO of the greatest virtues of stainless steel are its high mechanical strength and its tendency to harden under cold work. Yet when stainless steel was still new, these two properties caused some people to conclude that this useful metal was workable only with great difficulty by standard shop practice.

Today, workability is no longer a problem to those who know stainless

steel. Through a better knowledge of the nature of the metal—through practice in skillful fabricating techniques—and finally through the development of special modifications for special purposes (free-machining, free-spinning, etc.), it is today entirely practical to work stainless steel by every artifice of the metal worker, extrusion alone excepted.

There is no other metal offering

anywhere near the high physical properties of stainless steel nor its high corrosion-resistance which can approach this workability.

Don't let any problem in workability keep your product from enjoying the selling advantages of stainless steel. Ask us for a new illustrated circular on the fabrication of stainless steel or for specific recommendations on your specific problem.

## U·S·S STAINLESS STEEL

AMERICAN STEEL & WIRE COMPANY, *Cleveland, Chicago, and New York*

CARNEGIE-ILLINOIS STEEL CORPORATION, *Pittsburgh and Chicago*

NATIONAL TUBE COMPANY, *Pittsburgh*

Columbia Steel Company, *San Francisco, Pacific Coast Distributors* · United States Steel Products Company, *New York, Export Distributors*



# UNITED STATES STEEL

# "BEAUTY IS ONLY SKIN DEEP" WE ADMIT

However, we do not stop with outside appearance—  
NU-TREND Furnace Enclosures are beautiful, to be  
sure — Plus all the essentials of good construction  
and interior design.

## NU-TREND ENCLOSURES

•  
**Exclusive  
Colors**

•  
**Leveling  
Device**

•  
**Practically  
Boltless**

•  
**Precision  
Made**



•  
**Round  
Corners**

•  
**Aluminum  
FINISH  
Interiors**

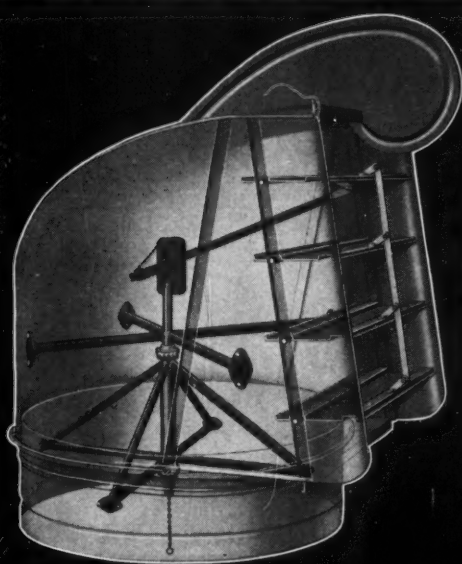
•  
**Exclusive  
Design**

•  
**Quickly  
Assembled**

•  
NU-TREND Cabinets especially designed for your equipment  
—in your own select and exclusive color combinations—will  
cut sales resistance "to the bone"—Just drop us a line and  
complete particulars will be sent promptly.

Manufactured by  
METAL PRODUCTS DIVISION  
**COLUMBUS HEATING & VENTILATING CO.**  
Columbus      ••      Ohio

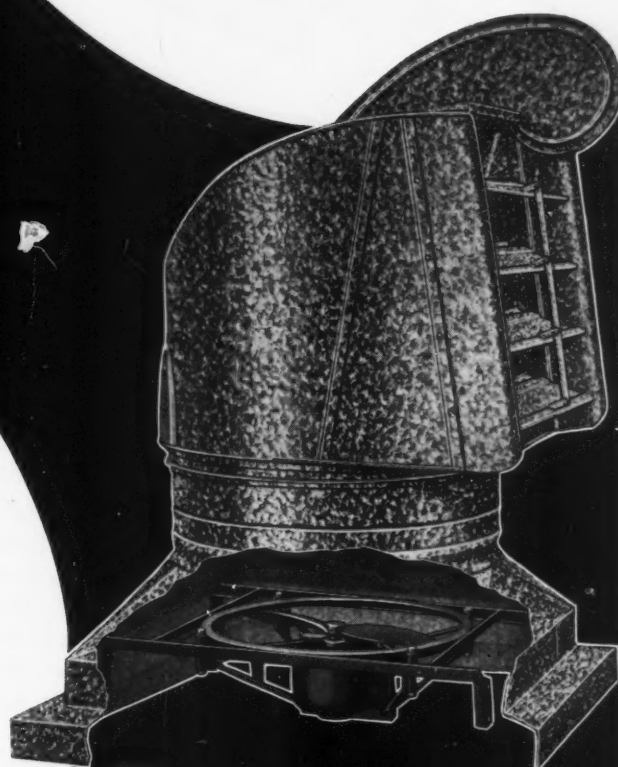
## *Correct Design in Ventilators Essential Today*



### **Swartwout ROTARY BALL BEARING VENTILATOR**

Ventilator Efficiency and Capacity depends upon correctness of design. The Swartwout Rotary (the original rotary ventilator) delivers greater capacity because it is basically correct in design. *Its overall diameter is approximately same as throat opening.* Compare this with other types of round ventilators. Use the Swartwout Rotary for real economy and satisfaction.

The Swartwout AirJector is the Swartwout Rotary with a high efficiency fan installed in the base. *Discharge is always with the wind*—thus securing greater capacity with less power. Write for bulletin.



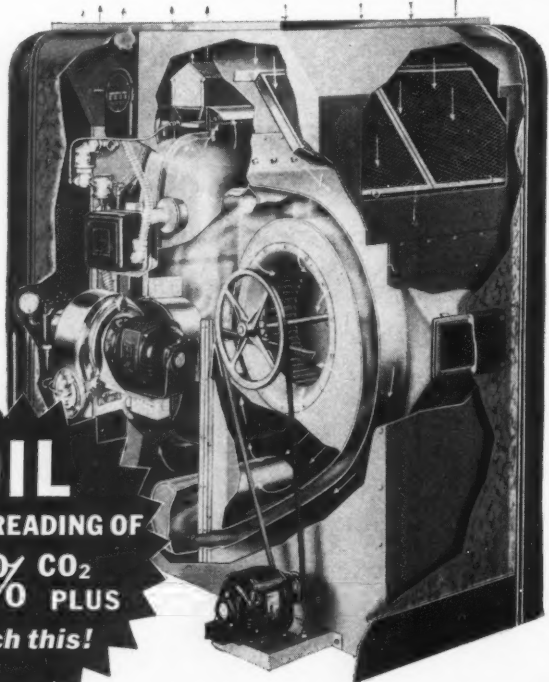
### **Swartwout AIRJECTOR** Name Registered U.S. Patent Office

**THE SWARTWOUT COMPANY**

18615 Euclid Ave., Cleveland, Ohio



# Try to Match



**OIL**  
GIVES A READING OF  
**13% CO<sub>2</sub>**  
**PLUS**  
*Match this!*

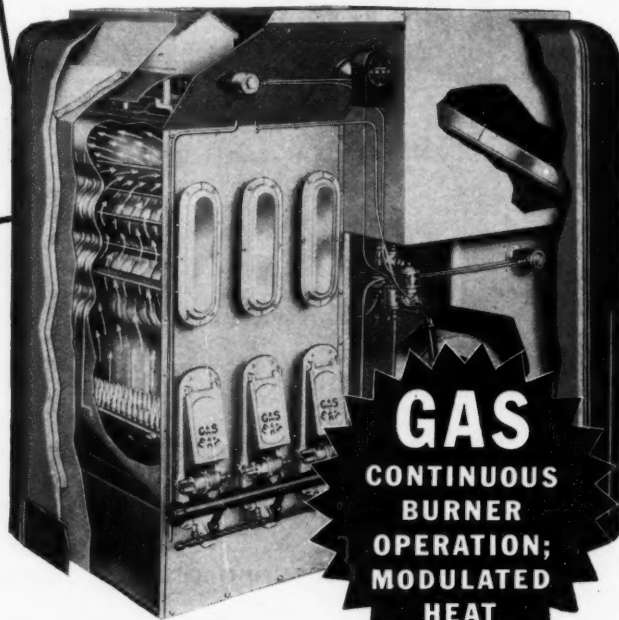
**YOU CAN GO TO TOWN WITH  
THIS REVOLUTIONARY  
MUELLER *oil* FURNACE**  
PATENTED  
**Years Ahead of the Industry**

Matchless! Revolutionary in design and performance. Sets new standard of efficiency and reduces fuel cost. Air passes over heating surface not once, *but three times*. Compact simplicity of design secures instant heat—eliminates parasitic losses, slow response and temperature override. The pressure atomizing type Mueller oil burner constantly secures a 13% plus CO<sub>2</sub> flue gas analysis, smooth operation and clean, odorless fire . . . on the job.

To Be Announced Soon . . .  
A Startling New Mueller Oil-Fired  
Air Conditioning Furnace for Smaller  
Homes and the Volume Market

**Try to match this  
Amazing *gas* Furnace**  
**Outmodes All Gas Furnaces Now in Existence**

Mueller Gas Era Furnaces, with the sensational patented Heatspeeder sections, bring quicker comfort, lower fuel costs and longer service—sends warmed air into the house 6 to 8 times faster than furnaces with old-style heating units. Handsome, dependable, fully automatic. Learn why, during the past 8 years, the Mueller Gas Era has outsold every other gas furnace. See it—or write for full details—today!



L. J. MUELLER FURNACE COMPANY, 2010 W. Oklahoma Ave., Milwaukee, Wis.

# MUELLER



# h this FOR '38!

**MUELLER STARTLES INDUSTRY WITH  
GREAT *new improvements* IN DESIGN  
STYLE • PERFORMANCE • ECONOMY • MERCHANDISING  
OF GAS, OIL, COAL fired equipment and fan-filter units!**

**COAL  
LIFETIME HEAT  
AT  
LOW COST**



Here is the aristocrat of warm air units for coal. A complete, compact unit which delivers clean, filtered warm air to every room. Due to flexibility of casing design, which provides interchangeable panels, fan-filtered unit may be placed at either side or back. When fan is to be at back, radiator is swung to the right or left to provide flue outlet at either side.

**CLIMATOR  
FAN-FILTER  
UNITS**



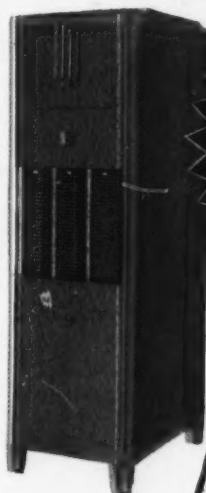
A size for every home. Also larger sizes for schools, churches, stores, etc. Replaceable filters of ample area... uniform air distribution... quiet operation... no metal-to-metal contact... adjustable fan sheave. Insures even, clean, healthful heat.

**SERIES  
"A"  
GAS  
BOILER**



Smartly styled, modern, compact. Features of design include... insulated cabinet... low standby losses... smooth, narrow flue travel... gas-tight cast iron sections... adaptable to steam, hot water or vapor heating... sizes for all needs. Completely automatic.

**MUELLERAIRE  
GAS-FIRED  
FORCED  
CIRCULATION  
HEATER**



Heats, filters, humidifies, and circulates the air. Heat transfer is by the famous Mueller HEAT-SPEEDER sections. Easily installed... readily moved... need not be permanent. Ideal for stores, shops, showrooms, basementless homes, etc. Quiet, no stratification, no cold floors.

THERE ARE MANY OTHER ITEMS IN THE BIG MUELLER LINE

Visit the Mueller Display in Booths 32 and 33 at the International Heating and Ventilating Exposition.  
See Mueller's 1938 array of the latest in Heating and Air Conditioning Equipment for all types of fuel.

# MILWAUKEE



BEAUTY and DURABILITY

**uni-fin**

GRILLES and REGISTERS

BARBER-COLMAN COMPANY  
ROCKFORD • ILLINOIS



# STEEL

*shrinks the map*  
OF  
AMERICA



Philadelphia used to be two days from New York. Now steel makes it in two hours.....You can live in healthful suburbs yet work in the city, because your steel automobile makes minutes out of miles .... You can do business with the nation and the world -- instead of only a few neighbors -- because of steel machinery and transport. Because it constantly conquers distance and discomforts, steel makes America the most compact and progressive continent in the world.

Because steel is so definitely part of our modern life, we take it too much for granted. Do you realize that there are not scores, not hundreds but thousands of kinds of steel? Each has a certain purpose or product for which it is best suited. Here at Youngstown, when we receive an order for steel -- no matter how small nor how routine the use -- we will not begin that order until we are certain we have exactly the right steel for the purpose.

## THE YOUNGSTOWN SHEET AND TUBE COMPANY

Manufacturers of Carbon and Alloy Steels  
General Offices YOUNGSTOWN, OHIO



# YOUNGSTOWN

Sheets - Plates - Pipe and Tubular Products - Conduit - Tin Plate - Bars - Rods - Wire - Nails - Unions - Tie Plates and Spikes

**Easier**

**THAN  
EVER  
TO INSTALL**

**The New  
AMERICAN....**

HERE'S WHY  
*The New* AMERICAN  
SELLS FASTER • MAKES  
YOU MORE MONEY

- 1 Griswold original one piece steel spindle and handle with new hump-design goes straight through pipe and plate before piercing opposite side . . . A twist of the wrist locks it tight.
- 2 Griswold high tension spring and nickel ferrules can't come off . . . takes the "dam" out of damper installation.
- 3 Griswold reversible plate of highest grade cast iron unaffected by heat . . . New design permits insertion of spindle from either end.

Sign and return coupon below for size,  
packing and price details.

**T**HE LEADER in damper design for more than half a century now shows more usable improvements than ever before . . . Here's the damper that stove and furnace men everywhere are demanding . . . Why? . . . Because these new exclusive features make it easier to sell, easier to install, more profitable than any damper you could recommend. Note the improvements that have been made in this old standby . . . The added quality which makes for greater satisfaction all around long after the price is forgotten. *You* know that it pays to sell and install the best.



**THE GRISWOLD MFG. CO.**  
ERIE, PENNSYLVANIA

THE GRISWOLD MFG. CO., ERIE, PA.  
Please send full details on Griswold New  
American Dampers to—

Your Name \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_

My Jobber \_\_\_\_\_



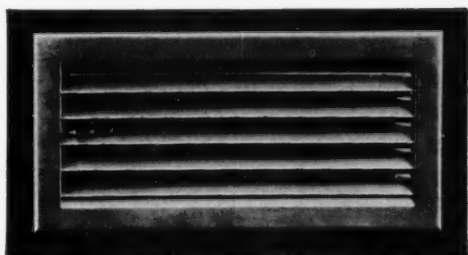
**NEW AMERICAN**  
*The Original Steel Spindle*  
**REVERSIBLE DAMPER**



# WATERLOO

## *Air Conditioning* **REGISTERS**

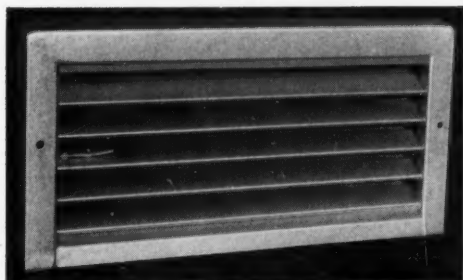
**NOW IN  
MATCHED SETS**



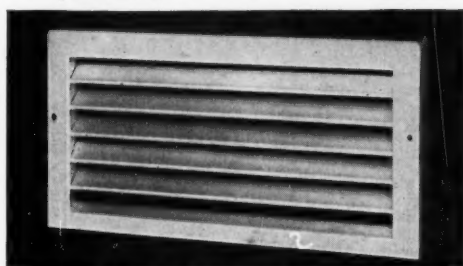
FH-100—Adjustable Venetian Type Flat Register for walls.



FHG-0-45—Venetian Type Flat Return Intake.



FH-205—Venetian Type Adjustable Register for baseboards.



FHD-1-45—Venetian Type Baseboard Return Intake.

A BIG, NEW sales advantage for heating and air conditioning dealers—Waterloo now offers a 4-way line of perfectly matched registers for every need. Wall and baseboard registers, baseboard and flat return intakes are now available in matched-design sets. Dealers can now offer custom designing in standard price ranges. — Home owners and builders will be quick to accept this new Waterloo feature. Waterloo dealers are due for another year of record-breaking sales and profits!

### **MORE FEATURES**

Other advantages that make Waterloo Air Conditioning Registers the outstanding value for 1938 are—the slanted louvres that reflect light and color, conceal the ducts—complete adjustable control of air-flow (90-degree range)—positive locking mechanism — tested capacities.

### **WRITE TODAY**

—for the new Waterloo Register Catalog, containing all the new matched designs, charts and installation data. No obligation.

### **WATERLOO REGISTER CO.**

**Waterloo, Iowa**

**Seattle, Wash.**

In New York—Air Conditioning Utilities, Inc., 8 West 40th St.  
In Los Angeles—California-Waterloo Register Co., 824 Clanton St.



# Repair parts

FOR ALL  
HEATING UNITS

No matter how small, how large,  
how old, or how new, REPAIR  
PARTS for all heating appliances  
can be secured from BRAUER, and  
at the RIGHT PRICE.

We are also Distributors for  
Filters, Blowers, Controls, Furnace  
Cements, in fact for all heating  
supplies and accessories.

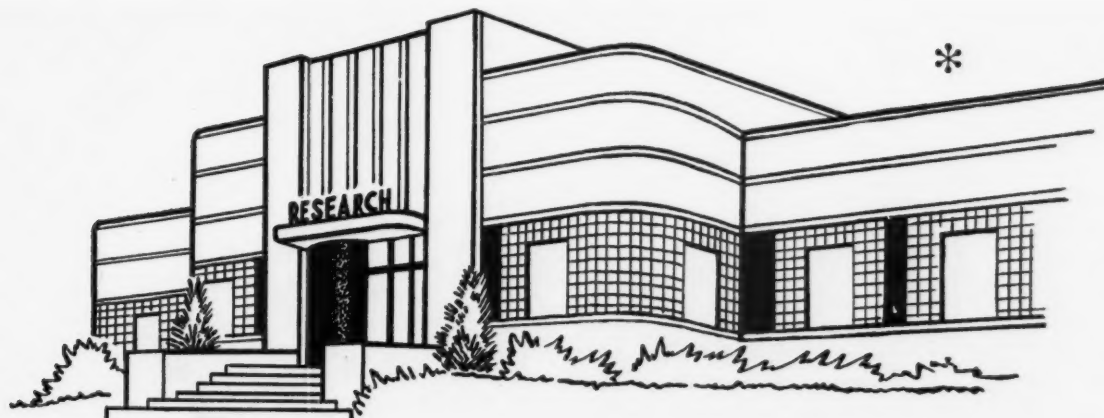
Just send your order to BRAUER.



**A. G. BRAUER SUPPLY CO.**

**316 North Third St.**

**St. Louis, Mo.**



## A QUICK DIGEST OF ARMCO SHEET METALS FOR YOUR EVERY PURPOSE

Whatever your sheet metal requirements may be, Armco can help you. Here you have access to a complete line of iron and steel sheets—a grade for every conceivable purpose. Call the Armco distributor salesman. Ask him to explain how you can profit more with these many useful metals.

### **GALVANIZED ARMCO INGOT IRON**

A highly refined iron developed by Armco. Noted for its easy-working qualities. The galvanized coating is full weight, tightly adherent, bright and attractive. Backed by 21 years of consistent national advertising assuring strong resale value. Use this durable metal for duct work, ventilators, roof drainage systems or wherever corrosive conditions are present.

### **ARMCO PAINTGRIP**

A special galvanized sheet for painting upon installation. No acid etching or weathering. Definitely retards peeling or flaking of paint. Ideal for ducts, gutters, downspouts and all exposed sheet metal work. Customers appreciate the immediate beauty of paint together with the full protection of galvanizing.

### **ARMCO STAINLESS STEELS**

A correct grade for every purpose. Can readily be sheared, punched, deep drawn, welded, riveted or soldered. Popular uses of Armco Stainless include decorative trim, sinks, drain boards, door sills, kick plates and many others where sanitation, attractiveness or quick cleaning is desirable.

### **ARMCO INGOT IRON HOT ROLLED**

Produced on Armco-invented continuous mills. True to size and gage and have a clean smooth surface obtained only by this per-

fect process. Welds densely and evenly and can be easily formed into smokestacks, fan blades, fuel oil tanks, heating elements and other equipment.

### **ARMCO H. T.-50**

A low-alloy high tensile sheet steel possessing great strength such as may be required in formed structural members. Armco H.T.-50 has four to six times the atmospheric corrosion resistance of ordinary steel.

Visit the Armco booth, number 69, at the Fifth International Heating and Ventilating Exposition, Grand Central Palace, New York City. January 24-28, 1938. Here you will see interesting exhibits of the metals we've briefly described and acquire much useful information on their application.

\*The new Armco Research Laboratories are the largest and most complete in the flat-rolled steel industry and staffed by men who have made many notable contributions to the development of iron and steel sheets. They are always ready to assist you on special sheet metal problems.

The American Rolling Mill Company, Executive Offices: 50 Curtis Street, Middletown, Ohio.



## **ARMCO SHEET METALS**



## PICK ANY ONE...

**Every Parker-Kalon TYPE "A" Sheet Metal Screw is Good!**

Put an imitation alongside a genuine Sheet Metal Screw and you might be fooled into believing the imitation to be "Just as Good." Both have hardened threads. They "look" alike under casual inspection.

However, "Just as Good" is found to end with appearance. Thousands of concerns have found that USE proves the difference between genuine Sheet Metal Screws, made only by Parker-Kalon, and the imitation. It leaves no doubt as to which screw actually saves time and labor... which one merely looks as though it will do the work and cut costs.

Genuine Sheet Metal Screws effect savings and make better fastenings, not because of their "looks" or hardened threads, but because of the way they are made and what they are made of. They always go in easily and quickly... always form

a perfect, strong-holding thread... always draw up tight without breaking. It is that perfect action which gives uniformly satisfactory results and cuts costs.

### *How to tell Genuine Sheet Metal Screws*

MADE BY PARKER-KALON, originators of the Sheet Metal Screw and possessors of unique equipment, specially developed to make these Screws.

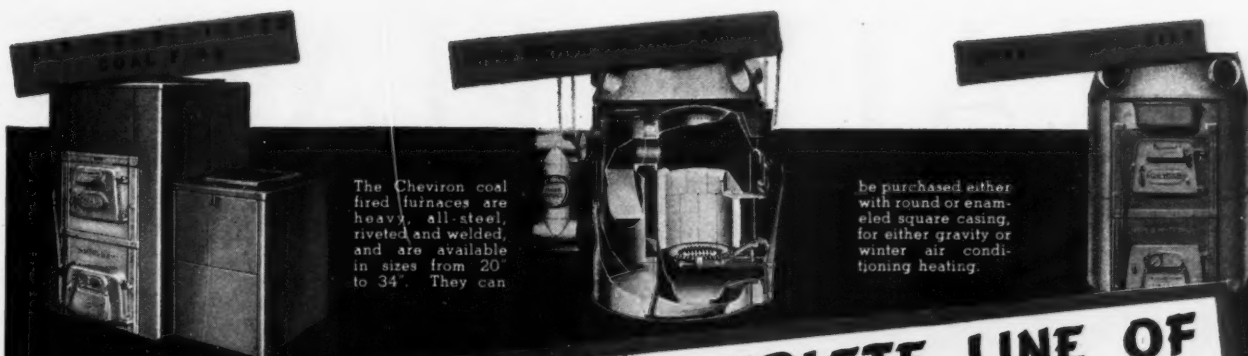
THEY HOLD... because the threads run full diameter right up to the head. THEY GO IN EASILY... because the threads are (1) designed with an expert knowledge of the work they must perform (2) held to a high degree of accuracy and uniformity. THREADS DON'T STRIP... HEADS DON'T TWIST OFF... because they are made from high grade steel wire of special analysis and are scientifically hardened by a process developed from over 20 years' experience in the manufacture of Self-tapping Screws.

PARKER-KALON CORP.  
200 Varick Street, New York, N.Y.

**PARKER-KALON**  
HARDENED TYPE A SELF-TAPPING  
**Sheet Metal Screws**

Sold only through Recognized Distributors





The Chevron coal fired furnaces are heavy, all-steel, riveted and welded, and are available in sizes from 20" to 34". They can

be purchased either with round or enameled square casing, for either gravity or winter air conditioning heating.

## THE CHEVRON COMPLETE LINE OF STEEL FURNACES ARE *Designed* AND *Priced* FOR THE VOLUME MARKET

The Chevron line is a complete line—whether the furnace is coal, oil or gas we have a size and a style for your needs.

The coal fired furnaces are heavy steel, riveted and welded, available in both round and square casing for either gravity or winter air conditioning heat.

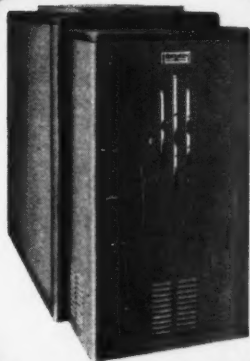
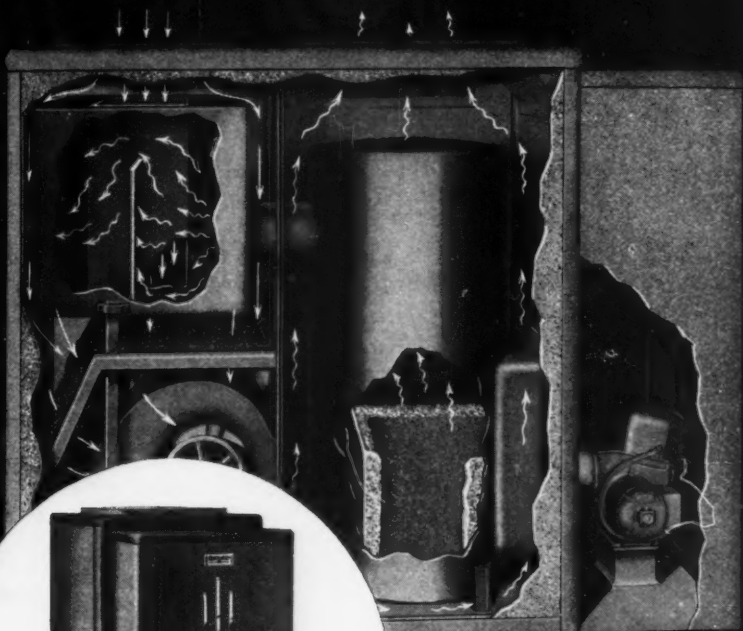
The Gas or Oil Fired Series are rugged, all-steel welded and designed to operate with equal efficiency burning either fuel.

Each Chevron furnace sold is backed by one of the largest manufacturers of steel furnaces in the world. Only such engineering and manufacturing facilities as these can give you America's finest furnaces at America's most popular prices.

### GAS OR OIL FIRED SERIES

No gas or oil fired furnace made is more efficient with either fuel than the Chevron Gas or Oil Series. Ideal because you have only one style to handle.

Made in five sizes—from 125,000 BTU output to 300,000. Can be purchased with or without either burner and controls. Beautifully finished in ripple green enamel.



MICHIGAN TANK AND FURNACE CORPORATION

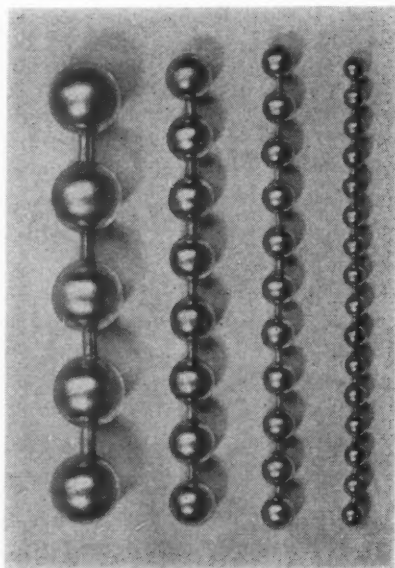
MAIL THIS TODAY

MICHIGAN TANK & FURNACE CORP.  
14101 Prairie Ave.  
Detroit, Mich.

Gentlemen:  
Please send complete information and prices on the Chevron complete line.

Name \_\_\_\_\_  
Street \_\_\_\_\_  
City \_\_\_\_\_  
State \_\_\_\_\_

# BEAD CHAIN\*



No. 20 BEAD CHAIN    No. 13 BEAD CHAIN    No. 10 BEAD CHAIN    No. 6 BEAD CHAIN

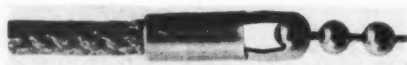
Illustrations Actual Size  
Samples on Request

Size No.	Dia. of Bead in Inches	Approx. Tensile Strength in pounds
6	.125	25-30
10	.187	45-50
13	.250	85-100
20	.375	175-200

## MATERIALS

Brass, Bronze, Gilding Metal, Nickel Silver, Aluminum; Chromium, Nickel, Gold and Silver Plate. Standard attachments as shown, or made to customers' specifications.

...



## CHAIN AND CORD COUPLING (Actual size)

This coupling, No. 10-V, makes a firm detachable connection between BEAD CHAIN and Venetian blind or sash cord. It is easily applied. For No. 10 BEAD CHAIN only.

\*Trade Mark Reg. U. S. Pat. Off.

The non-kinking and swiveling characteristics of BEAD CHAIN\* make it advantageous for use in regulator adjustments.

BEAD CHAIN\* adds but little to the cost of any heating or ventilating unit and greatly improves the appearance and operation of the finished job.

BEAD CHAIN\* is adapted to sprockets that have been designed for the automatic regulation of dampers and ventilators, that work smoothly and efficiently.

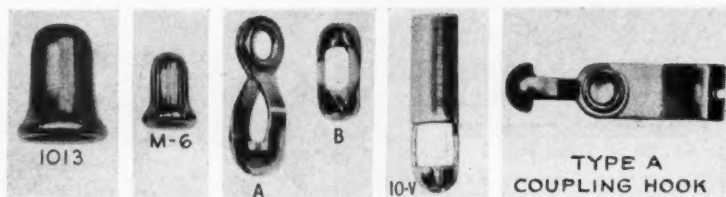
BEAD CHAIN\* may be had in bulk and cut lengths, with couplings and attachments, or in assemblies to meet the specifications of the manufacturer.

BEAD CHAIN\* engineering service is prepared to co-operate fully with manufacturers in the design of assemblies where the use of chain is necessary or desirable.

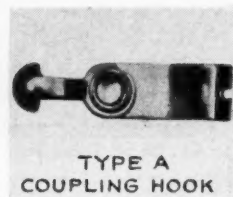
## DETACHABLE PENDANTS



## NON-DETACHABLE PENDANTS



## COUPLINGS

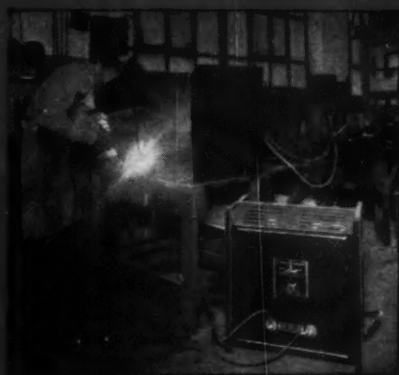


Trade Mark Reg. U. S. Pat. Off.

**THE BEAD CHAIN MANUFACTURING CO.**  
BRIDGEPORT CONNECTICUT

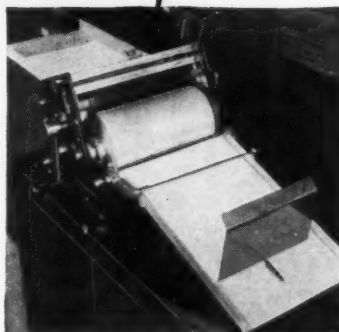
# CUTS COSTS More Than 85%

## G-E Mutator Welding Set Pays for Itself in Six Months



**T**HIS is not an unusual case. Hundreds of alert, progressive manufacturers are using this low-current arc welder for light-gauge fabrication and repair work; and like this user, they are getting better results at lowered costs.

You may not manufacture duplicating machines, but you may have sufficient light-gauge work to warrant the use of one or more of these small welders. The G-E Mutator can help to produce superior results and greater profits on any job requiring welding current of 15 to 90 amperes.



Standard New Process Duplicator



G-E Mutator, new  
low price, \$150

If your fabrication or repair work involves any considerable amount of light-gauge welding, it will pay you to get further information. Just call the nearest G-E arc-welding distributor or G-E sales office, or fill in the coupon and return it to us.

To give you the right welding equipment, General Electric manufactures the most complete line of arc welders in the world.

General Electric  
Dept. 6C-201, Schenectady, N. Y.

- ☐ Please send me Bulletin GEA-2447C, describing the G-E Mutator.
- ☐ Can I use the G-E Mutator successfully on my work? (Attach description of work.)

NAME .....

FIRM .....

STREET .....

CITY .....

STATE .....

140-76

STANDARD  
MAILING MACHINES Co.  
Duplicating Machines Division

F. W. STORCK, PRES.  
ELMORE ANDREWS, VICE PRES.  
ALBERT W. VANDERHOOF,  
GENERAL SALES MANAGER

EVERETT, MASSACHUSETTS  
September 16, 1937

Mr. R. C. Anderson  
Welding Engineering Sales Corporation  
140 Federal Street  
Boston, Massachusetts

Dear Mr. Anderson:

You have asked how the new Mutator is doing on our job of fabricating the gear and cam assembly used on our standard new process duplicator. There is no doubt that it has helped us improve the quality of this particular part considerably. At the same time it has helped us make a cost reduction of over 85% in the manufacture of this assembly --- a figure which is even more than we originally expected. At this rate, the savings will more than pay for the welder in six months.

Our operators seem to like the welder fine and we are inclined to believe you are right in claiming that "anyone in the business of fabricating or repairing light-gauge metal will find this welder a real money maker."

Yours very truly,

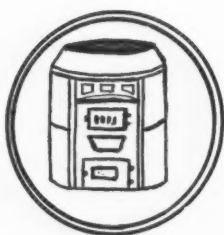
*D. P. Bourn*  
PRODUCTION MANAGER

# GENERAL ELECTRIC

Filing No. 8748



# WE HAVE EVERYTHING



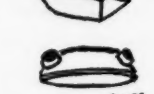
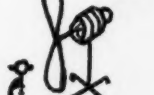
DISTRIBUTORS OF

## NORCO PRODUCTS:

Asbestos Paper and Cement  
Ash Pans  
Ash Pit Doors  
Blowers  
Boiler Repairs  
Boiler Cleaning Compounds  
Boiler Grates  
Bonnets  
Broiler Pans—All sizes  
Brushes  
Casing Collars  
Cast Furnaces  
Cement  
C-I-C Enamel Cleaner  
Circulators  
Chain  
Chimney Cleanouts  
Chimney Tops  
Clinker Tongs  
Cook Stoves  
Copper Furnace Coils  
Dampers  
Doughnut Stoves  
Draft Adjusters  
Draft Regulators  
Elbows  
Fans  
Filters  
Fireclay  
Fireplace Dampers  
Fireplace Equipment  
Fireplace Grates  
Fittings  
Float Valves  
Flue Brushes  
Floor Registers  
Flue Scrapers  
Flue Stoppers  
Forced Air Fittings  
Furnace Brushes

Furnaces — (Norco Cast Steel, or Air Conditioning Unit)  
Furnace Check Dampers  
Furnace Cleaners  
Furnace Pipe & Fittings (Angles, Elbows, Galvanized Tees)  
Furnace Pokers  
Furnace Regulator Accessories  
Furnace Repairs  
Furnace Slicer Bars  
Furnace Tees  
Gas Burners  
Gas Cocks  
Gas Ranges  
Gas Range Repairs  
Grilles  
Heat Controls  
Hot Water Coils  
Hot Plates  
Hot Water Thermometers  
Humidifiers  
Industrial Gas Burners  
Kitchen Heaters  
Kreuter Pliers  
Laundry Stoves  
Mica  
Non-Con-Dux Asbestos Products  
Norco Furnaces (Cast, Steel & Air Conditioning Unit)  
Oil Circulators  
Oil Stoves  
Oil Stove Repairs  
Paints  
Porcelain Door Handles  
Furnace Vacuum Cleaners

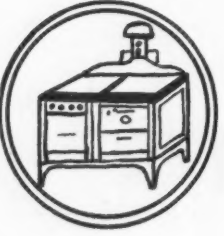
Pokers  
Quadrants  
Registers & Register Faces  
Repairs for all Makes of Furnaces & Boilers  
Shovels  
Snips  
Soot Destroyers  
Springs and Clips  
Spring Handles  
Stove Boards  
Steel Furnaces  
Stove Cleaner  
Stove Knobs  
Stove Lid Lifters  
Stovepipe Collars  
Stovepipe Dampers  
Stovepipe Elbows (Corrugated and Adjustable)  
Stovepipe  
Stovepipe Tees  
Stovepipe Wire  
Stove Pokers  
Stove Polish  
Stove Putty  
Stove Repairs  
Stove Shakers  
Stove Urns  
Tank Heaters  
Tees  
Tinnerns Red & Gray  
Tinnerns Snips  
Tin Fittings  
Thermometers  
Turpentine  
Ventilators (Accurate)  
Water Pan Fillers  
Wire Drop Handles  
Wicks  
Wire



## NORTHWESTERN STOVE REPAIR CO.

Manufacturers of Stove, Furnace and Boiler Repairs

662 WEST ROOSEVELT ROAD, CHICAGO, ILL.

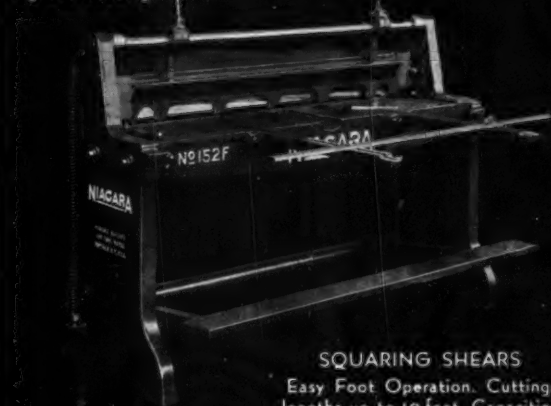


# Why Sheet Metal Men Use

## NIAGARA MACHINES and TOOLS

For Better Work and Better Profits

No. 164  
UNIVERSAL ROTARY  
COMBINATION MACHINE  
with Interchangeable Rolls for  
burring, turning, wiring, crimp-  
ing and beading.



SQUARING SHEARS  
Easy Foot Operation. Cutting  
lengths up to 10 feet. Capacities  
up to 16 Gage.



SLIP ROLL FORMERS

BAR FOLDERS

Easy, smooth, quick opera-  
tion, accurate work, ability  
to handle the new stainless  
and other alloys,--you get  
them ALL with the com-  
plete Niagara line. There  
is the right size and type  
of machine to save time  
and material on every job.

Write for catalogs on the  
complete Niagara line.

ELECTRIC COMBINATION  
MACHINE for fast production.



POWER SQUARING SHEARS

# NIAGARA

NIAGARA MACHINE AND TOOL WORKS, BUFFALO, N. Y.  
NEW YORK - DETROIT

# Selling Stoker-Ola Is Such A Logical Thing To Do!

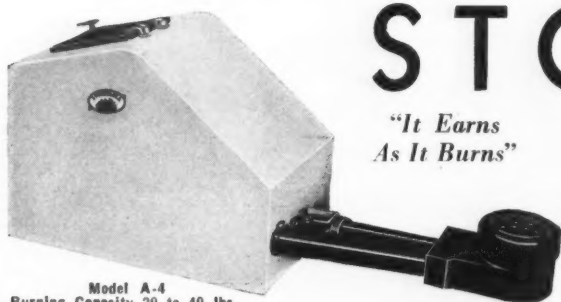
You sell and install furnaces . . . furnaces require fuel . . . coal is the most common fuel . . . stoker-firing is the most convenient, economical and efficient way of firing . . . room temperatures are automatically maintained . . . furnace performance is most satisfying . . . customers are gratified . . . and you have made an EXTRA profit on the STOKER-OLA installation.

## Selling Stoker-Ola Is Such A Logical Thing To Do!

Its Price Is \$199<sup>50</sup> Completely  
installed  
with controls.

QUALITY: Americans want things made right. IN STOKER-OLA your customers get (1) Westinghouse motor. (2) Heavy cast-steel screw. (3) Ball Bearing—for long life. (4) Extra large streamlined steel hopper. (5) Minneapolis-Honeywell controls. (6) THREE-year guarantee—our PROOF of real quality.

SIMPLICITY: STOKER-OLA is absolutely gearless! Only TWO major working parts! Coal feed settings unlimited. Stoker-Ola's gearless simplicity is the marvel of the industry's outstanding engineers. It means delighted customers for you—and trouble-free service for them!



*"It Earns  
As It Burns"*

# STOKER-OLA

**Advance Appliance Co., Inc.**  
808 South Washington St. Peoria, Illinois

Send Us Your Franchise Details  
(Sign name and address below.)

### No Gears More Years

-- and more profits! "Service Costs" don't wipe out the profits you hope for, when you install STOKER-OLA. We have ample letters from present distributors to prove it!

If you are seeking a dealership or distributorship in the fastest-growing business in America today, wire us at once — and get the stoker your competitors will wish they had.





# Anthracite Industries Laboratory

## RENDERS A MOST IMPORTANT SERVICE TO THE HEATING TRADES

The work being conducted by Anthracite Industries Research Laboratories is of immediate and genuine value to the heating contractor. The Laboratories are constantly testing Anthracite equipment submitted by manufacturers. Out of this close cooperation suggestions often come that result in improved design and efficiency of the equipment. When equipment passes the rigid standards of the Laboratories it is awarded the Anthracite Industries Seal of Approval. This seal is now on 104 pieces of modern Anthracite equipment, produced by 71 manufacturers. The Seal is a symbol of quality and efficiency of the equipment that bears it. That is why the Anthracite Industries Laboratories Seal is fast becoming a big factor in equipment sales. It makes your selling easier. Your customers have greater confidence in their purchase. If you wish to know more about the work of Anthracite Industries Laboratories, write for descriptive folder. Better still, visit the Laboratories—at Primos, Pa.



This Seal of Approval appears on Anthracite equipment only after it has passed the most rigid tests in the heating field.

**ANTHRACITE INDUSTRIES INC., CHRYSLER BUILDING, NEW YORK**

# Selling Stoker-Ola Is Such A Logical Thing To Do!

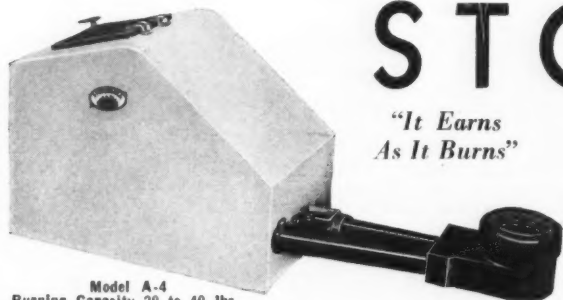
You sell and install furnaces . . . furnaces require fuel . . . coal is the most common fuel . . . stoker-firing is the most convenient, economical and efficient way of firing . . . room temperatures are automatically maintained . . . furnace performance is most satisfying . . . customers are gratified . . . and you have made an EXTRA profit on the STOKER-OLA installation.

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Model A-4  
Burning Capacity 20 to 40 lbs.

# STOKER-OLA

*"It Earns  
As It Burns"*

**Advance Appliance Co., Inc.**

808 South Washington St.

Peoria, Illinois

Send Us Your Franchise Details  
(Sign name and address below.)

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-- and more profits! "Service Costs" don't wipe out the profits you hope for, when you install STOKER-OLA. We have ample letters from present distributors to prove it!

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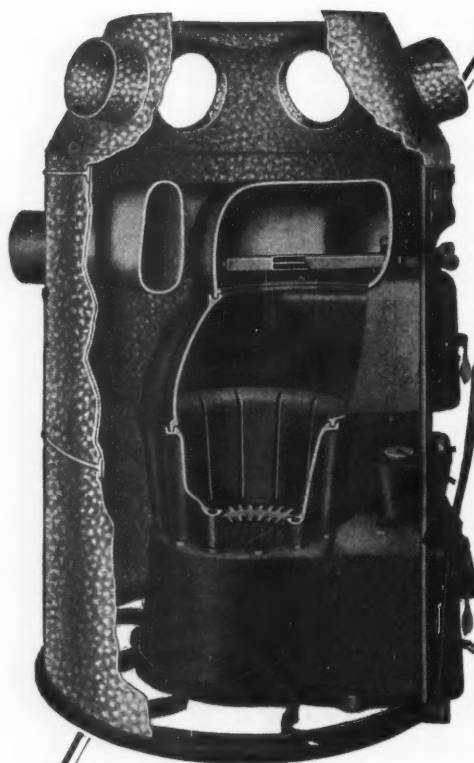
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This Seal of Approval appears on Anthracite equipment only after it has passed the most rigid tests in the heating field.

**ANTHRACITE INDUSTRIES INC., CHRYSLER BUILDING, NEW YORK**





**WISE  
GRAVITY UNIT**

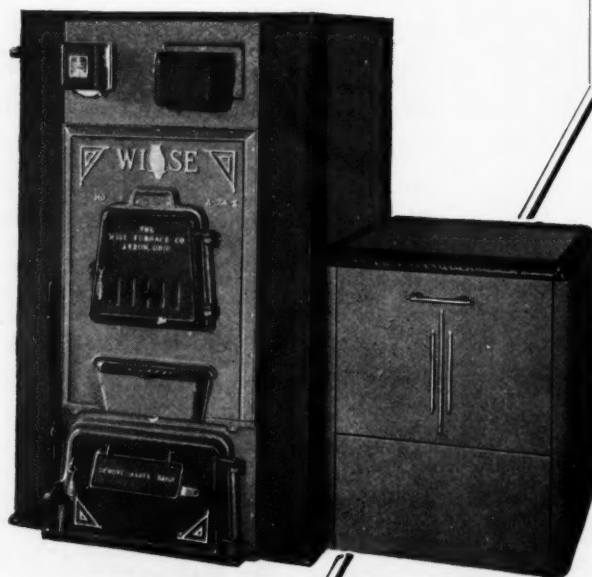
## A WORD ABOUT WISE IS SUFFICIENT

**G**ENERALLY speaking, that's entirely true. However, if you come to one of those hard-to-sell prospects who wants more details on why the WISE Master Model A is the best buy in the gravity heating field, just show him the **NEW ONE PIECE SELF CLEANING RADIATOR** that provides a larger combustion chamber and more prime heating surface . . . and which *will not* fill up with soot and dirt . . . the **NEW ASHPIT AND LOWER FRONT**, all in one piece to eliminate joints, and make installations easier . . . the **ONE PIECE CELLULAR FIREPOT**, proved by university tests to be *at least* nine per cent more efficient than the solid type . . . the **PERMANENT DOMESTIC HOT WATER SUPPLY**, worth the price of the furnace alone when he wants a quick morning shave (available at slight extra cost) . . . the **ONE-PIECE SQUARE BASE AND ENAMELED SQUARE CASING FOR AIR CONDITIONING USE** that will fit in right up to snuff with any decorated basement.

You'll get many a replacement job this season . . . and be sure you protect the customer and the job by specifying and installing a **MASTER Model A Wise Furnace**.

Complete winter air conditioning is now available with the new Wise line of air conditioning furnaces. These furnaces may be had for either coal or gas and with either cast iron or steel heating elements.

Air conditioning is the magic phrase in the heating field and wide awake heating men will cash in on it. Air conditioning plants are gaining wide acceptance from the public and a golden harvest awaits contractors who push the sale of Wise air conditioning furnaces. Write us today for particulars on this up-to-the-minute line. You'll get the chance to step out in front of your competitors and cash in on those early spring and summer replacement jobs.



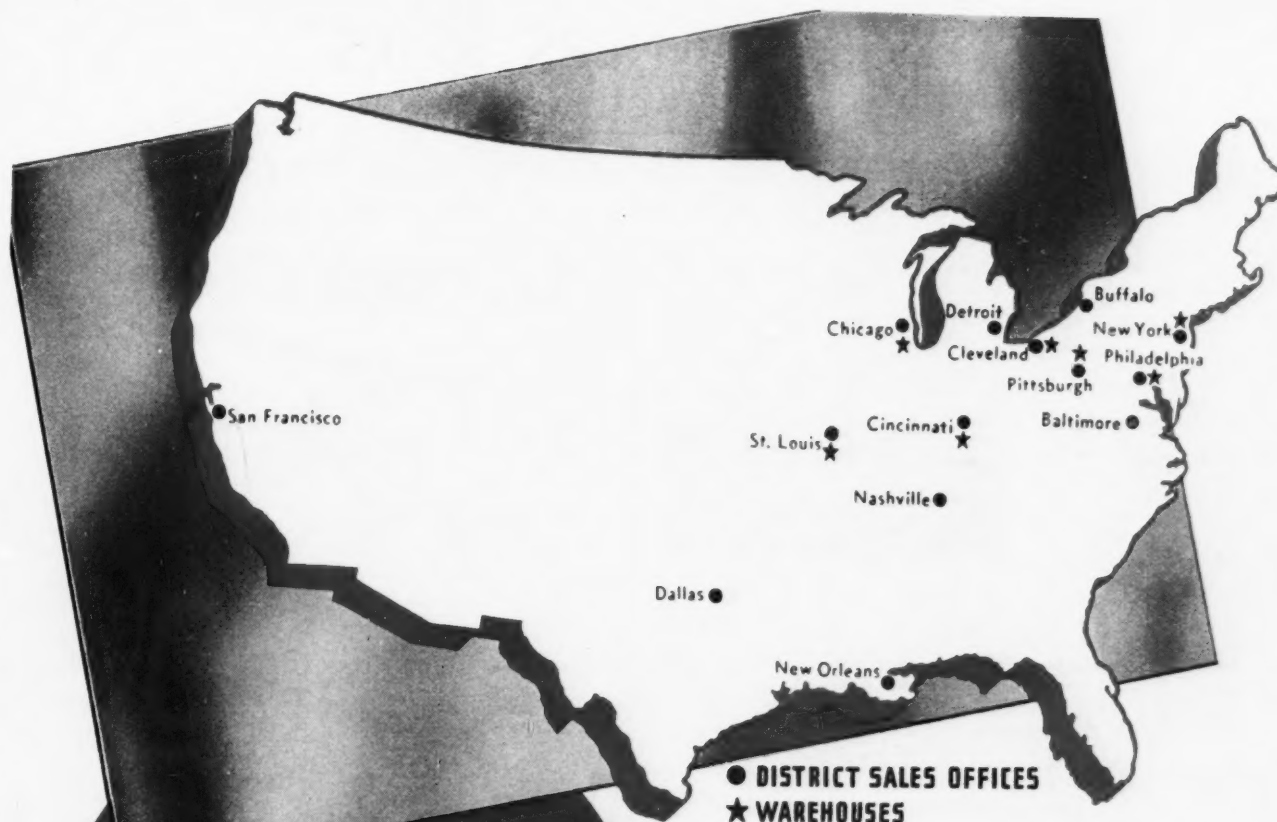
**WISEAIR CONDITIONING UNIT**

## WISE FURNACE COMPANY

AKRON

♦ ○ ♦

OHIO



## A NATIONWIDE COPPER and BRASS SERVICE

### HUSSEY FABRICATED PRODUCTS FOR SHEET METAL CONTRACTORS

In addition to quality Sheets and Rolls, you will find Hussey Copper Service 100 per cent complete including Conductor Pipe ... Eaves Trough ... Shingles ... Nails ... Elbows ... Rivets—all made to the traditional Hussey standard of quality. Write today for the Hussey Catalog—a valuable handbook of information that is complete and up-to-date.

No matter where you are located . . . no matter what you may require in copper . . . whether it be quality copper sheets or pre-fabricated forms . . . the HUSSEY organization with its nationwide network of sales offices and warehouses, can serve you superlatively well.

SEVEN strategically located HUSSEY Warehouses with full stocks of quality copper sheets and roofing material is your guarantee of a dependable, ready source of supply . . . 13 HUSSEY Sales Offices, located from coast to coast assure prompt dispatch of your order as well as expert counsel on copper roofing material problems when required.

Check over the HUSSEY map of service and supply shown above—get in touch with your nearest HUSSEY office and let us demonstrate the highly geared, streamlined service behind HUSSEY Copper and Brass Service.

### C. G. HUSSEY & COMPANY

A Division of Copper Range Co.

ROLLING MILLS AND GENERAL OFFICES: PITTSBURGH, PA.

Warehouses in the Principal Cities

*Copper*

**HUSSEY**

*Brass*

# WISS TINNERS SNIPS

## BEST BY ACTUAL TEST

PRECISION GROUND—ACCURATELY TEMPERED—FACTORY TESTED  
"HIGH-POWER" SNIPS WILL CUT ALLOY METALS

### WISS SCROLL- PIVOTER SNIP

Cuts circles, scrolls, and squares as easily as a straight line.

Here's a sensational new snip, the exclusive features of which cannot be appreciated until you have actually cut with it. No other form-cutting snip will do a quicker or better job—in fact, the pivoting principle of this new snip enables it to cut intricate shapes with an incredible ease that no other snip can equal. It will cut ordinary galvanized sheets up to 18-gauge, and Monel Metal sheets of average thickness. Now furnished with one blade serrated unless otherwise ordered.



Number	Length	Finish
9X	12 in.	Dull Gray Nickel

### REGULAR PATTERN TINNERS' SNIPS

Inlaid Crucible Steel Blades  
Gun Metal Finish Handles

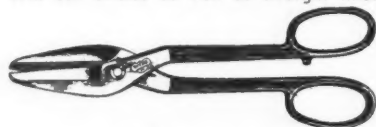


"High Power" Snips Marked \*

Number	Full Length	Length of Cut	Number	Full Length	Length of Cut
13	7 in.	2 in.	* 9	12 1/2 in.	3 in.
12	8 in.	2 in.	* 8	13 3/4 in.	3 1/2 in.
11	9 1/2 in.	2 1/4 in.	* 7	14 1/2 in.	4 in.
*10	11 1/2 in.	2 1/2 in.	* 6 1/2	15 3/4 in.	4 1/2 in.

### COMBINATION PATTERN TINNERS' SNIPS

Inlaid Crucible Steel Blades  
Will cut circles as well as straight lines



Number	Full Length	Length of Cut
*100	11 1/2 in.	2 1/2 in.
* 19	12 1/2 in.	3 in.
* 18	13 1/2 in.	3 1/2 in.
* 17	14 1/2 in.	4 in.

### CURVED BLADE PATTERN TINNERS' SNIPS

Inlaid Crucible Steel Blades



Number	Full Length	Length of Cut	Number	Full Length	Length of Cut
11 C.B.	9 1/2 in.	2 1/4 in.	8 C.B.	13 3/4 in.	3 1/2 in.
10 C.B.	11 1/2 in.	2 1/2 in.	7 C.B.	14 1/2 in.	4 in.
9 C.B.	12 1/2 in.	3 in.	6 1/2 C.B.	15 3/4 in.	4 1/2 in.

### "NU-GRIP" SNIPS

With or Without Springs

WONDERFUL CUTTERS

EASIER TO USE



### COMBINATION PATTERN

For Curved, Irregular and Straight Work

This Combination or Scroll Nu-Grip Snip with spring will cut curves, circles and irregular work faster, neater and easier than any other snip of its type. For use on templates, fixtures and metal pattern work. Furnished in two sizes.

Number	Length
U C-8	8 in.
U C-9 1/2	9 1/2 in.



### REGULAR PATTERN — For Straight Work

The Straight pattern Nu-Grip Snip, equipped with spring, is the finest and fastest tool of its size for straight cutting on metal—much easier to operate. Furnished in two sizes.

Number	Length
U-7	7 in.
U-8 1/2	8 1/2 in.



### NEW BULLDOG SNIP FOR HEAVY DUTY

Precision Ground, Inlaid Crucible Steel Blades  
Short Powerful Jaws and Long Handles  
Give Wonderful Leverage

Made in Two Lengths

Name	Length	Length of Cut
*Bulldog	o/a	2 1/2 in.
*Bulldog	17 in.	2 1/2 in.
	14 in.	



### LIGHT METAL SNIPS No. J-7 With Curved or Straight Blades

This handy Snip is the best known and most universally popular type used for light metal work, by electricians, tinsmiths, plumbers, jewelers, dental workers and wherever light metal templates or patterns are required to be cut.

It is light—strong—easily handled—made of fine tool steel, accurately tempered, and is ideal for all-purpose light work. It is a surprisingly powerful cutter.

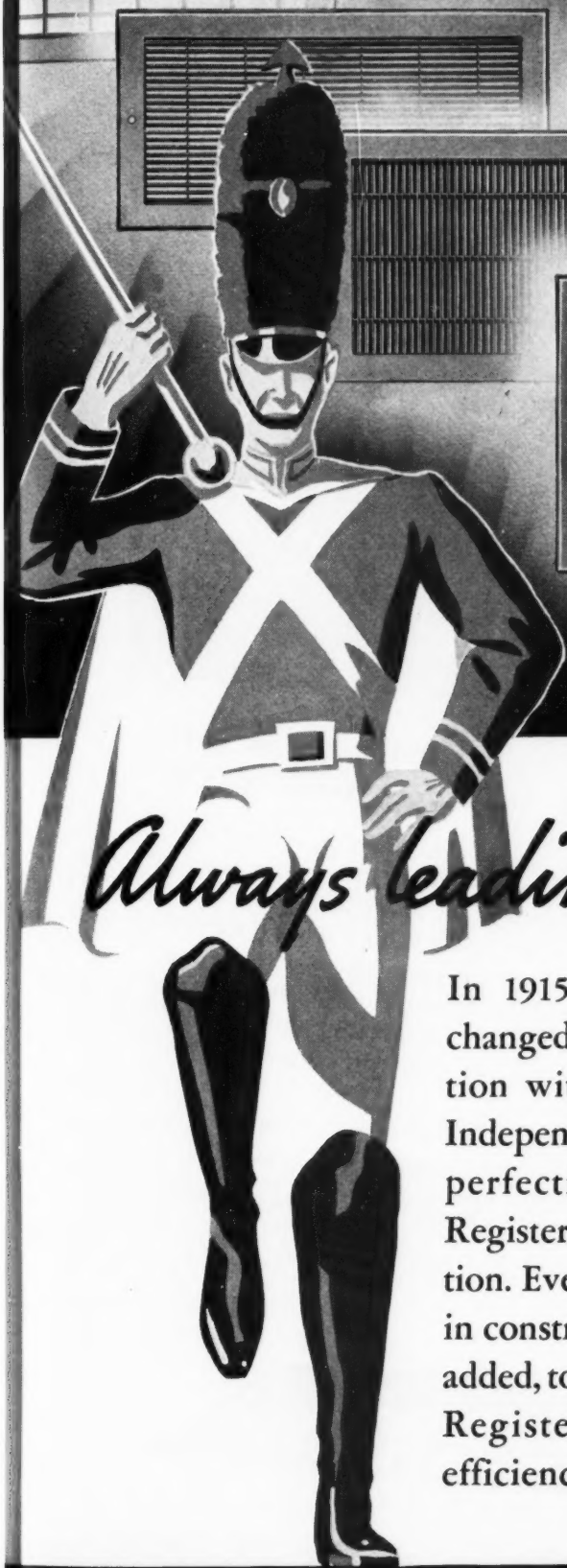
Number	Length	Cut
J-7	7 in.	1 1/4 in.

J. WISS & SONS CO., NEWARK, N. J.

LEADERS SINCE 1848



# INDEPENDENT "FABRIKATED"



*Always leading... always progressing*

In 1915 Independent broke tradition and changed the whole course of register construction with the introduction of "Fabrikated." Independent scored again in developing and perfecting Adjustable Directed Air Flow Registers and Grilles with "Fabrikated" construction. Every year improvements and refinements in construction and design are constantly being added, to the end that Independent "Fabrikated" Registers and Grilles continue to lead in efficiency, appearance, strength and rigidity.



#### **EVERY GRILLE BAR IS SET INDIVIDUALLY**

Every grille bar can be adjusted individually, either before or after installing, to produce any desired deflection of air flow.

## THE INDEPENDENT REGISTER CO.

3741 EAST 93rd STREET

CLEVELAND, OHIO

# IT'S EASY to Drill in Tough Stainless Steel with SKILSAW **SLOW-SPEED** DRILLS! HIGH TORQUE

• SKILSAW "SLOW-SPEED"  $\frac{1}{4}$ -in. Drills are used for fast drilling of structural braces in fountain and fixture manufacturing.



• Equipped with a hole-saw, SKILSAW "SLOW-SPEED" Drills cut round outlets, up to  $4\frac{1}{4}$  in. diameter, in square or circular tanks, ducts, etc.



Built for YOUR work . . . will speed up your drilling . . . and save your twist-drills!

Toughest drilling jobs become quick and easy with SKILSAW'S new "SLOW-SPEED" Drills . . . they almost punch holes in Monel, Alleghany and stainless steels . . . they're ideal for fast drilling in ALL sheet metals! Powerful motors maintain spindle speed whether loads are light or heavy—twist drills last longer because they're not sharpened as often. Try SKILSAW "SLOW-SPEED" Drills on your toughest jobs . . . and you'll never want any other kind.

See your supply distributor and write for our new catalog.

SKILSAW, INC., Dept. A, 3320 Elston Avenue, Chicago  
214 E. 40th St., New York • 52 Brookline Ave., Boston • 1429 Spring Garden,  
Philadelphia • 1253 S. Flower St., Los Angeles • 2065 Webster St., Oakland

# SKILSAW

**PORTABLE Electric TOOLS**  
SAVE MONEY IN EVERY INDUSTRY!  
• SAWS • DRILLS • BELT SANDERS • DISC SANDERS • GRINDERS • BLOWERS •

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evenly  
the SU





• The mark of Superior Galvannealed means open hearth steel of special analysis rolled to accurate, uniform gauge; tempered correctly for exacting sheet metal work; and its even coating of prime spelter so heat-treated as to create an alloy bond with the steel.

## MORE THAN A FINE PAINTING SURFACE

Superior Galvannealed is accepted as the ideal material for jobs that are to be painted, lacquered or enameled. Its heat-treated, matte-like surface is free from the spangles and the surface condition which makes galvanized sheets difficult to paint. But it has other features equally vital to an enduring finish.

Superior Galvannealed is highly amenable to

severe forming. Its heat-treated zinc coating is so fully alloyed with the steel that it does not fracture or flake in forming, thus guarding against rust undermining the finish.

Moreover, Superior Galvannealed brand carries prestige in many industries as does no other coated steel sheet. Let it help bring you jobs, reduce their cost, and assure their permanent satisfaction.

**THE SUPERIOR SHEET STEEL COMPANY**

Division of Continental Steel Corp., U. S. A.  
CANTON, OHIO

SUPERIOR GALVANIZED steel sheets of special-analysis open hearth steel are correctly tempered for shop work and evenly coated with zinc by the SUPERIOR process.



# SUPERIOR

OPEN HEARTH STEEL SHEET

Superior Galvannealed  
"Super-Metal"  
Special Coated

Hot Rolled Annealed,  
Pickled, Deoxidized  
Cold Rolled

Galvanized Sheet  
Galvanized Roofing  
Long Ternes



# IT ALWAYS WORKS!

## - IN 2 WAYS

● Many sheet metal contractors have been so well pleased with the working qualities of Toncan Iron that they have taken time to write and tell us how well it cuts, bends, punches, welds, etc.

Thus, Toncan Iron works well in two ways. First, for the contractor because it is softer than mild steel, exceedingly ductile and can be formed into any sheet metal commodity. Second, for the customer because it resists rust and corrosion better than any ferrous material in its price class — thereby lasting longer and saving money. Cold-working in the shop has no material effect on its high rust-resistance.

Why not take advantage of the superior working qualities and rust-resistance of this modern sheet metal — also the Republic advertising which carries the story of Toncan Iron to industry every month? Stock and use Toncan Iron — in black, galvanized or galvanized finish. Write for complete detailed information.

**Republic Steel**  
*Corporation*

GENERAL OFFICES . . . CLEVELAND, OHIO



**REPUBLIC**  
**STEEL**

REG. U.S. PAT. OFF.  
**TONCAN**  
COPPER  
MO-LYB-DEN-UM  
**IRON**

HIGHEST RUST-RESISTANCE  
IN ITS PRICE CLASS

When writing Republic Steel Corporation for further information please address Department A.A.

# AMERICAN ARTISAN

Volume 107

Number 1

## 1937—What Was the Record?

**1**937—FOR business in general and the warm air heating and metal working industry in particular—was a year of mixed trends. The year began with all activities progressing at a high level (in many cases above the boom period of 1929); in our own field heating contractors in many areas carried work over from 1936; there was an encouraging volume of new and remodeling construction under contract and a great deal of work in contemplation. All activities of the field felt this press of work ahead and, accordingly, held high hopes for a 1937 even better than 1936.

The break came in most parts of the country during October; in some areas a few weeks later; in some areas a gradual slackening appeared a few weeks earlier. During October and November new work in many activities stopped abruptly—so abruptly, in fact, that the situation was graphically described by one contractor—“just like drawing a curtain.” Although work let to contract fell off, reports from all parts of the country continued to indicate that a huge volume of work was “still being figured,” many contractors reporting that they were figuring more jobs than ever before.

### What Caused the Break?

Little can be added, now, as to just what caused the break—already hundreds of thousands of words have been published and hundreds of reasons why offered. The advocates of these “reasons why” range from the highest economist to the “man on the street” and their reasons from fourth dimension economics to plain loss of employment. It must be sufficient, then, for the purpose of this review to say simply that the first nine months of 1937 were encouragingly ahead of 1936, but the last three months discouragingly behind. As for the totals of the two years, however, 1937 seems to win out.

This business “recession” directly affects this annual review. Whereas in former years manufacturers were able to say with confidence that their

production for the year would be so many units, this year such reports are not available. In answer to our questionnaire on production most manufacturers declared themselves unable to make any accurate forecast. “We cannot report until after the end of the year,” was the usual reply.

In view of this situation it is necessary to postpone American Artisan’s annual review of business, so far as actual production figures are concerned, until later in the year.

### Galvanized Sheets

There are, nevertheless, a number of interesting sidelights to 1937 as a business year in our industry. For example, production of sheets and sheet metal of all types. It is not unlikely that 1937 saw the production and conversion to jobs of a greater tonnage of galvanized iron than any year in mill history. This use of galvanized iron can be traced directly to use in air conditioning. By money volume, according to the Air Conditioning Manufacturers’ Association, the installed cost of equipment sold by members was 85 millions of dollars for 1937 as compared to just under 50 millions in 1936. This sum does not include accessory equipment, nor sheet metal nor sheet metal labor.

Since there exists a fairly definite relationship between cooling tonnage and metal work (including sheet metal labor) it seems logical that this 70 per cent increase in equipment is paralleled by a somewhat similar increase in amount of galvanized iron and sheet metal labor. Some engineers formerly contended that air conditioning could not be counted as wholly new business since a great deal of air conditioning merely replaces former ventilation contracts, but observation seems to indicate that commercial air conditioning is not replacing straight ventilation, but is going into heretofore untouched markets. At the same time, industrial ventilation and public building ventilation (such as school houses) continues to conform to existing ventilating laws and is widening in application.

The only overlap, so far as we can judge, comes from places of public gathering such as theaters and here air conditioning, rather than ventilation, has been commonly accepted for a number of years.

#### Fabrication of Duct Work

From the big metal contractor's standpoint it is of some interest—but probably not news—that industrial ventilation and commercial air conditioning has now become the backbone of the sheet metal shop. The fabrication of skylights, metal windows, cornices, under current and recent business conditions, has become a minor activity by comparison or been completely discontinued and has been replaced by fabrication of duct work.

About the only former activities which have held their pace and in many shops increased in volume, are the fabrication of sheet metal equipment and industrial blow piping. Such items as kitchen and restaurant equipment have, under the impetus of new metals, established wide, new markets and a great many shops now consider such work a substantial part of their yearly volume.

Architectural metal work in 1937 continued at low ebb. A few public or semi-public buildings were roofed with metal or adorned with metal work, but by and large, architectural metal jobs of outstanding character were negligible in number or size in 1937.



All activities associated with new house construction suffered during the last several months of 1937. During the last part of 1936 a number of forecasters visualized a 1937 program of more than 400,000 homes of all sizes. These "guesses" were based upon the need for homes, scarcity of houses for rent, better income, shortage of dwelling units of all types in many parts of the country and more flexible financing methods. These guesses may have overlooked such factors as the tendency of many families to follow employment from area to area; the still debatable decline in ambition to own a home; and the basic inability of many families to gather sufficient money to make any down payment or carry any monthly payments, no matter how low.

In any event American Builder magazine, using figures from the Bureau of Labor Statistics, says this—

In 1937 permits were issued and houses were assumably built to the number of 289,000. This includes houses erected in towns where permits are not required. About 82,000 homes were built in

towns under 2,500 population and for rural families not living on farms. About 30,000 homes were built on farms.

Corresponding figures for 1936 were—267,000, 77,000, 27,000 respectively.

The same publication believes that in 1938 there should be an increase in number of homes built of between 10 and 20 per cent above 1937.

In this connection, there is the question of what percentage of this nation-wide construction ordinarily is warm air heated. For conditions prior to January, 1935, the projected Real Property Inventory shows that 39.4 per cent of all homes were heated by warm air, 6.4 per cent by hot water, 7.9 per cent with steam or vapor, 46.2 per cent with stoves or other types of non central appliances.

No similar report has been made for years after 1934, but American Artisan last summer made a



survey in a city where every heating system installed is known and recorded and brought to light that—

Of existing installations in 1934, 58 per cent were warm air; 63 per cent of the total heating sales in 1936 and 66 per cent of the total in the first seven months of 1937 were warm air. Further, the trend to forced warm air is equally marked. Forced air was 26 per cent of the total of all warm air systems in 1936; and 37 per cent in the first seven months of 1937.

With these figures of a typical city in mind, it is probable that of *all* homes constructed in 1937 warm air was used to heat a great majority having central heating systems and the trend is upward. No matter what the final figures for 1937 may be, it is certain that warm air heating will predominate.

#### Furnace Sales

From scattered reports available—and it should be remembered that these figures are in no way average or definite—it seems that production of furnaces in 1937 should be somewhere around 15 to 20 per cent above 1936, whose figure was 350,000. Whether dealers are going into 1938 with larger stocks of furnaces on hand is not known. Neither are stocks on hand of manufacturers known.

Checks made among contractors during 1937 showed that during the first seven months, sales of furnaces by dealers were running from 10 to 25 per cent ahead of 1936.

More complete returns came from the manufac-



turers of fans and blowers. In this group (including all large manufacturers) the highest increase reported for housed units was 147 per cent above 1936. The lowest increase was 30 per cent. The highest increase for assemblies was 324 per cent and the lowest increase 45 per cent. The highest increase in propeller types was 300 per cent and the lowest increase 22 per cent.

#### Fans and Blowers

No fan or blower manufacturer reported any decrease in production. This report substantiates the typical city survey discussed earlier—that forced warm air is increasing in acceptance. Just how the total number of gravity furnaces installed will compare with total number of gravity units for years previously cannot be determined. It may be that both gravity and forced air installations are increasing annually in number at the expense of other types of heating.

#### Humidifiers

Data are not available on number of humidifiers manufactured in 1937. From reports received there was an average increase of 35 per cent among manufacturers reporting an increase and an average decrease of 19 per cent among manufacturers reporting decreases. Again it should be emphasized that these reports are sketchy and do not include several of the largest producers. With all the emphasis being placed upon the need for humidification it is probable that more systems contained provision for automatic humidification, under control, than any year previously.

We should like to add something to the question of popularity of steel vs. cast iron. However, no figures are available. Any authentic data would have to be compiled from actual figures by units, submitted by all manufacturers and such figures are not obtainable. Among producers reporting increases in total production, the average increase in cast iron units was 81 per cent and for steel 85 per cent. Without actual unit productions, however, these percentages are only indications.

#### Automatic Firing

That there is a trend toward automatic firing—gas, oil, stokers—is common knowledge. The government reports increases in oil burner-furnace

units of 62 per cent for the first nine months over the same period a year ago. Among the reports received from furnace producers a larger percentage of units were shipped with oil burners than in 1936 and a larger percentage of furnaces designed especially for oil burning but shipped without burners was also reported.

#### Gas Furnaces

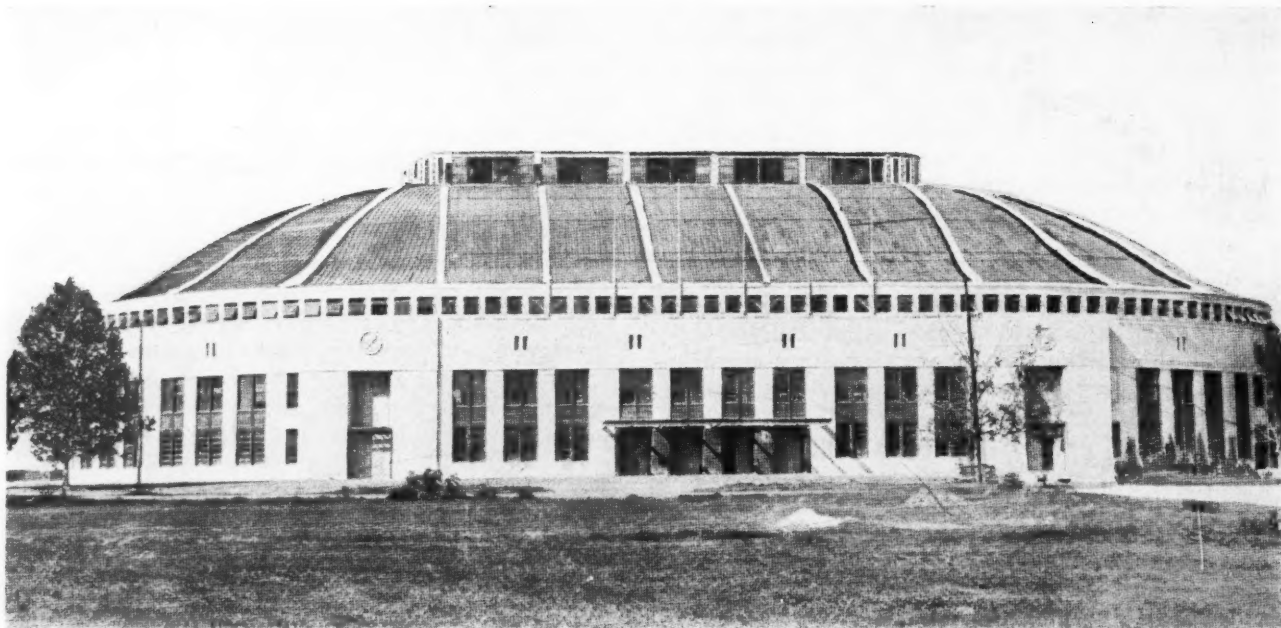
No data are available covering increases or decreases in total sales of gas furnaces. Some manufacturers who formerly made a considerable number of gas furnaces reported a drop in sales. Other manufacturers reported increases. Several communities where large sales of gas furnaces formerly were reported now show decreases, but to offset this drop, new areas are swinging to gas due to more advantageous gas rates or to changes in types of houses. This change in house types is of some interest in that some areas now show owner preference for houses without basements where compact gas furnaces placed in closets are being adopted.

#### Stokers and Stoker Furnaces

Specific data are not yet available on stoker furnaces. For the first time American Artisan includes in its 1938 listings of products, names of manufacturers making a furnace especially designed for stoker application and sold without or with a stoker. That stoker sales have increased tremendously is shown by reports from the U. S. Bureau of Census for 108 manufacturers. These reports show an increase in sales of all sizes and types of 27.4 per cent for the first ten months over 1936 and 131 per cent over the first ten months of 1935. For the first ten months of 1937, sales of domestic size stokers ran 86 per cent of total sales of all sizes. In terms of units domestic stokers ran over 93,000 units for 1937 as compared with 63,000 units in 1936.

A number of furnace manufacturers who prior to this year used standard types of furnaces for stoker application, this year announced furnaces designed strictly for stoker application. Changes in construction included addition of clinker ventibules, changes in size of combustion chamber and alterations in prime heating surface. From reports received it seems as though the next year or two will see many additional strictly stoker furnaces introduced.





1—This illustration is reproduced from a retouched photograph. Actually, every line of the hips, monitor and roof panels is as sharp and straight as instruments can make it. The roof is 373 feet long, 220 feet wide and 106 feet from gutter to monitor base.

## 1937's Largest Copper Roof

By W. J. Weitkam

Engineer, Holzer Sheet Metal Works, Inc.

IN Baton Rouge, Louisiana, is located Louisiana State University, one of the most progressive and rapidly growing universities in the United States. The present Governor of Louisiana, Hon. R. W. Leche, like former Governor Huey P. Long, devotes a great deal of time to the requirements of this institution, because he feels that providing the proper facilities for the young manhood and womanhood of Louisiana will better fit them for the various fields in life that they may choose to follow.

Among the recent improvements to this splendid college provided by Governor Leche, is the new "Agricultural Center", a magnificent structure of steel, tile and stucco, measuring 373 ft. long by 220 ft. wide, with a total height from the performing floor to the top of the monitor of 92 ft.

The architects, in preparing their plans for this structure, decided that for the purpose of economy in maintenance, and to insure the pleasing effect desired the use of copper for the roof and other general sheet metal work would best meet their requirements.

The contract for the sheet metal work was awarded to the Holzer Sheet Metal Works, Inc., of New Orleans, Louisiana. This firm is one of the oldest sheet metal firms in the South, having been engaged in the sheet metal and roofing business for

the past sixty-six years, organizing in 1871. Its present officers are sons of the organizer. R. J. Holzer is the President, and J. E. V. Holzer, is Secretary and Treasurer.

The roof, as can be noted, has on each end a complete circle which projects upward to the monitor in graceful curved lines. The remaining sections of the building, which are the front and back, or South and West Elevation, are composed of five straight sections, which also project to the monitor in the same graceful manner, thereby creating an elliptical shaped section, with the roof curved upward to the base of the monitor.

The area of this roof was of such a magnitude that without special care in planning, it would not have been possible to use copper, because of the usual expansion and contraction which would normally occur. It was also required that the proper provision for expansion and contraction be provided in the main walls and floor of the building. There was therefore provided in the vertical or exterior walls of the building, at the beginning of each curved section, copper expansion joints as noted in Fig. 1, Plan View, and Fig. 2, Elevation, and Fig. 3, Section. The copper joints were made of 24 oz. lead-coated copper so as to eliminate the possibility of any discoloration of the wall sections.

There was also provided at the top of each ex-

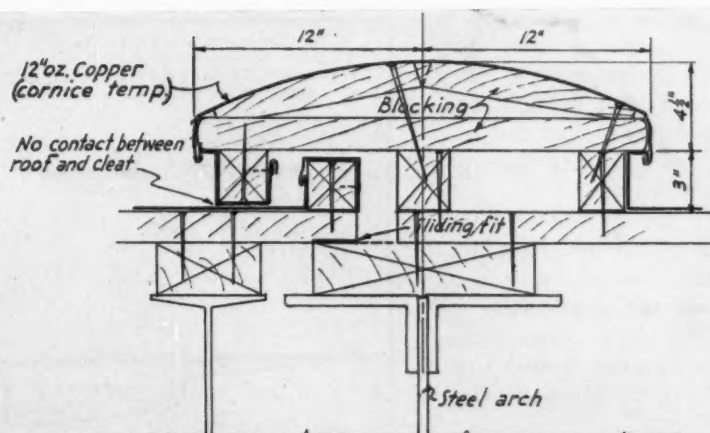


Fig. 6- SECTION R-R - EXPANSION JOINT THRU RIB ON ROOF

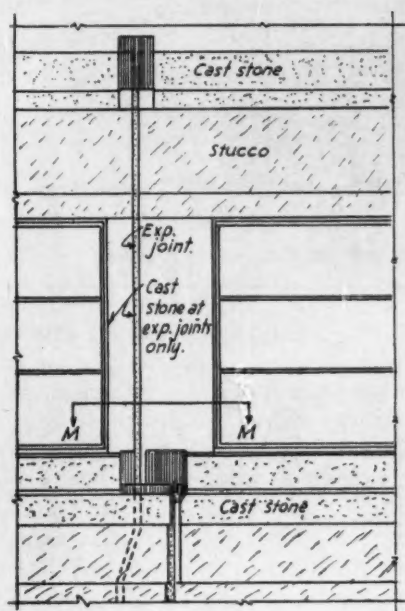


Fig. 2- ELEVATION

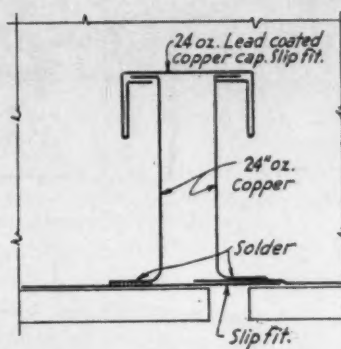


Fig. 4 SECTION S-S

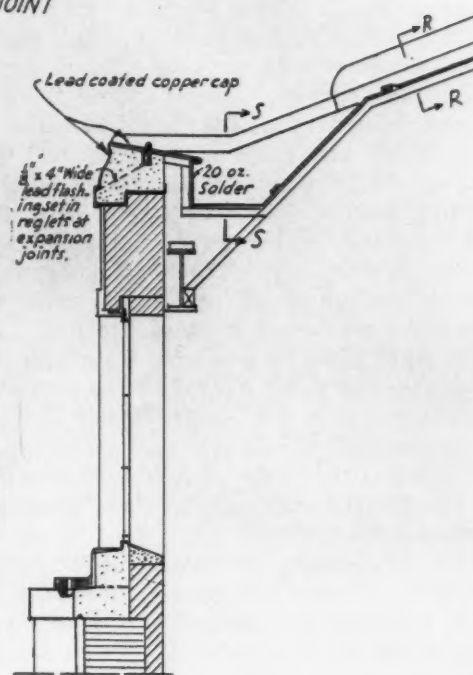


Fig. 3 SECTION

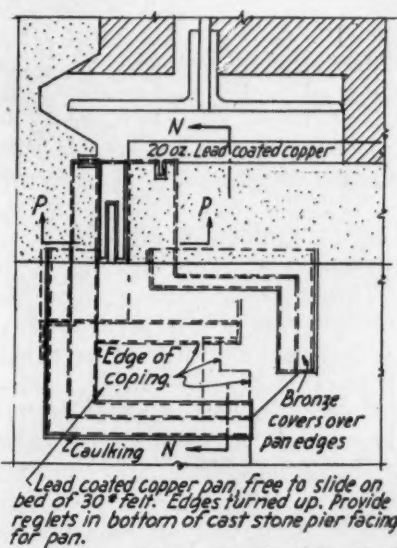
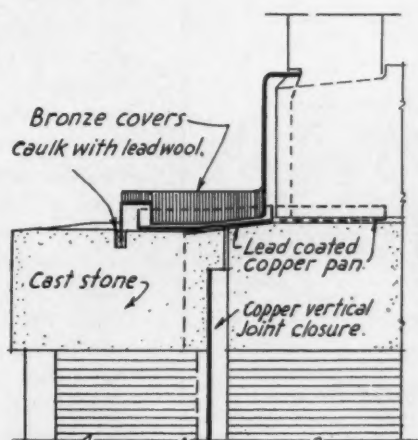
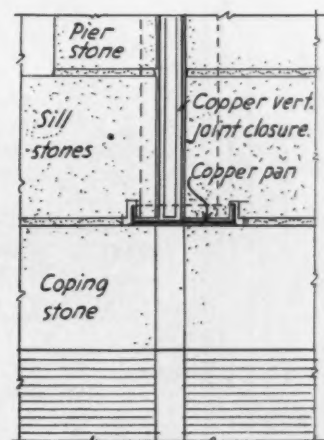


Fig. 1- PLAN AT M-M (See Fig. 2)



SECTION N-N



SECTION P-P

2—This group of details illustrates the attention to expansion and contraction in the copper and in the building proper. As explained in the text, several innovations were employed to insure against failure from the metal moving. This care was essential because of the tremendous size of the metal surface.



pansion joint on the cast stone cap of the parapet, a lead-coated copper cap caulked into a reglet provided in the cast stone. To further protect this joint, a  $\frac{1}{8}$  inch by 4 inch sheet lead section was placed between the two stones that abut the expansion strip. This is provided so the expansion joint would not be fractured.

Fig. 3 shows the shape of the gutter and the method used in securing the gutter to the stone capping on the parapet wall. Especial care was taken in this work; details of the application of this work were submitted to the Copper and Brass Research Association for their comments and suggestion, and the following system of application was used:—

First, there was installed in the reglet of the stone a separate strip of copper which was caulked for  $\frac{3}{4}$  of the depth of the reglet with lead wool, and the remainder with caulking compound. This piece of copper was then single locked to the cap that covered the flat top of the wood blocking of the gutter. The vertical side of the gutter was then single-locked to the above cap and then folded over, providing a loose lock joint. The section of gutter that formed the bottom was provided with a filler piece, double locked to provide a definite space in which expansion and contraction could take place. The gutter continued upward on the slope noted and was locked by a  $\frac{3}{4}$  inch loose lock joint to the main roof section. No nails were used at any point in the gutter.

Cross section S-S., in Fig. 3, indicates the expansion joints that were installed, as shown in Fig. 4. There were twenty-eight of these joints used in the entire gutter; the total length of gutter is 980 feet. 20-ounce copper was used for all work in the gutter. All drainage was concealed, using cast iron pipe with special outlets as shown in Fig. 5 and had special strainers as noted.

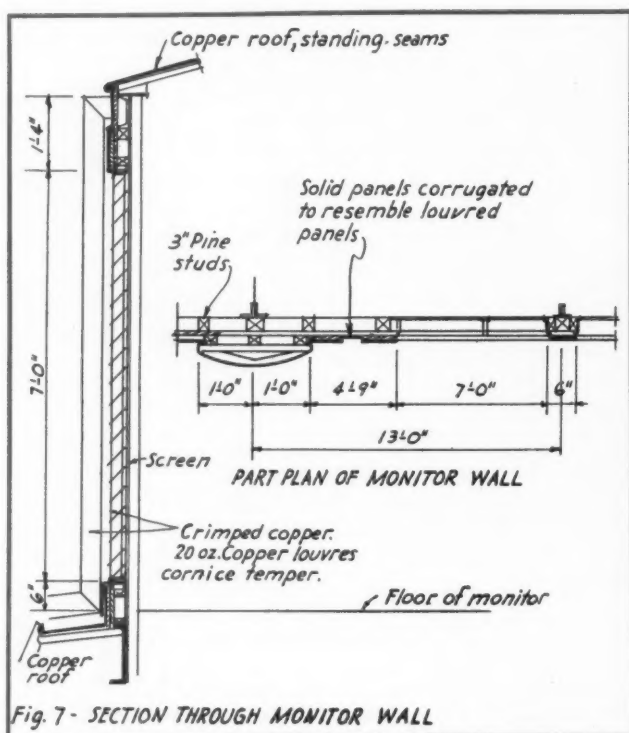


Fig. 7 - SECTION THROUGH MONITOR WALL

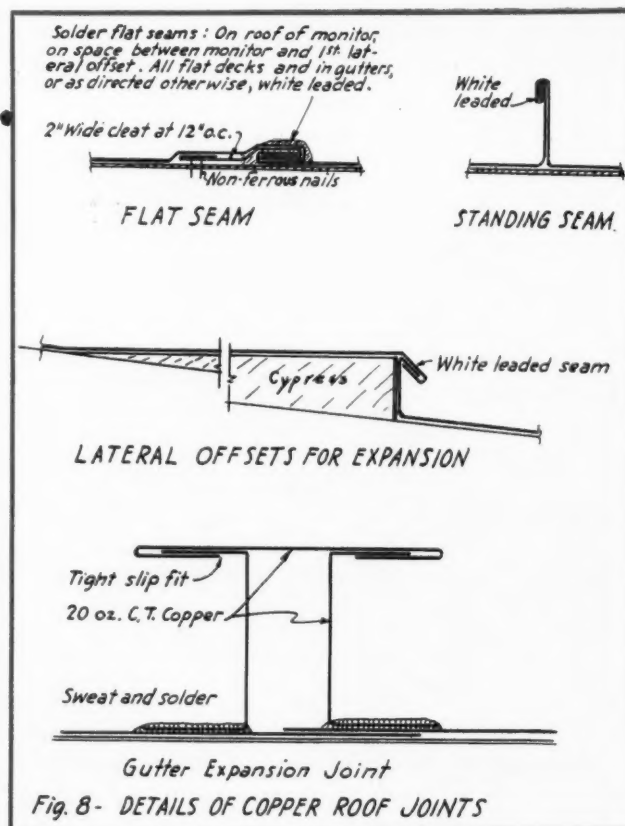


Fig. 8 - DETAILS OF COPPER ROOF JOINTS

As mentioned, the building is provided with four definite points of expansion. Each such expansion joint continues across the roof and a section showing how this was accomplished is shown in Fig. 3, noted as R.R., and in Fig. 6, section through rib on roof at building expansion joint.

As noted in Fig. 6, this rib is 24 inches wide and was covered with No. 16 oz. copper in sections 35 inches long, each sheet being locked to the flashing on one side and to the roofing on the other, and cleated to the wood decking on top. No nails were used anywhere, excepting through the cleats. For the purpose of symmetry, the roof was divided into equal spaces and additional ribs of the same design were provided. These ribs are pronounced, as can be noted. Each rib is 106 feet from the valley to the base of the monitor. These ribs continue up the vertical surface of the monitor and complete the graceful lines as noted on the roof. This can be seen in Fig. 7.

From the ground the distinct lateral lines, which were especially designed as noted in Fig. 8 are plainly visible. These lateral offsets create between the ribs individual roofs with areas approximately 26 feet by 26 feet. Counting these panels, the entire roof surface is divided into a total of ninety independent roofs in both curved sections, and fifty independent roofs in the straight section, or a total of 140 roofs measuring approximately 26 by 26 feet.

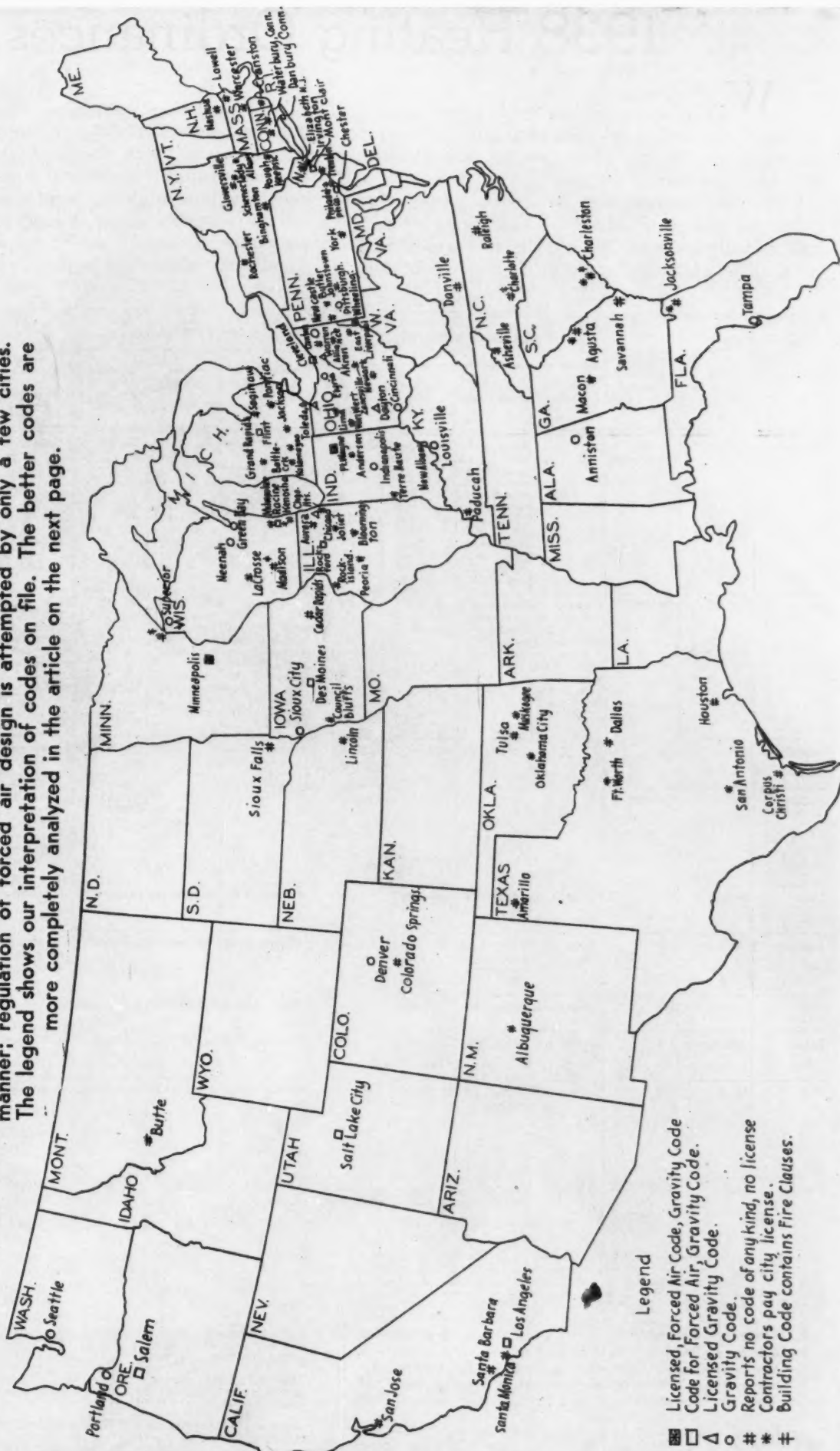
It will therefore be seen that all requirements have been provided to care for expansion and contraction.

In Fig. 7 are also shown metal louveres that are

(Continued on Page 176)

# Cities Having Heating Ordinances (January 1, 1938)

On this map we have shown all cities having known codes or ordinances containing regulations for warm air heating. Some of these regulations are pitifully inadequate; a number cover gravity warm air heating in a satisfactory manner; regulation of forced air design is attempted by only a few cities. The legend shows our interpretation of codes on file. The better codes are more completely analyzed in the article on the next page.



## Legend

- Licensed, Forced Air Code, Gravity Code
- △ Code for Forced Air, Gravity Code.
- Licensed Gravity Code.
- # Reports no code of any kind, no license
- \* Contractors pay city license.
- + Building Code contains Fire Clauses.

# 1938 Heating Ordinances

WITH increasing interest in codes governing the design and installation of gravity and forced air warm air heating, codes now in force in cities may be of interest.

From questionnaires sent to known cities having codes, the following tabulation has been prepared. Undoubtedly there are other codes not presented—we shall be glad, in that event, to receive data.

The tabulation emphasizes the fact that many building codes contain provisions for fire safety; but, generally, such provisions are inadequate or are based upon regulations now obsolete. As a general rule it might be pointed out that these fire safety measures cover chimney construction, the protection of smoke and heat pipes adjacent to woodwork, installation of stacks but might, in the

State	City	General Building Code and Date of Last Revision	CHIMNEY CONSTRUCTION				FIRE PROTECTION			MATERIALS		
			Chimneys, Height	Chimney Construction	Openings Into Lined Flues	Framing at Chimneys	Woodwork Near or Over Furnace	Smoke Pipes Thru Wood Construction	Woodwork Near or Over Smoke Pipes	Materials of Warm Air Pipes	Insulation of Warm Air Pipes	Wall Stacks, Material and Insulation
Washington	Seattle	Yes, 1937. Furnace Code 1926	4	1 sq. in. for each 1½ sq. in. smoke pipe area. Chimneys over 400 sq. in. to have tile 2 ft. below, 6 ft. above smoke pipe. 78 sq. in. min. flue area	20	Covered	32 plus 2" cover	40a, 40b	50a, 50b	I.C. tin or G.I., 26 ga. up	No combustible material closer than 3" within 10 ft. of bonnet, unless protected. 60	I.C. tin or G.I. with layer of 12 lb. asbestos paper. Double pipe need not be covered
Oregon	Portland	Yes, 1935	Flues less than 150 sq. in. to be 2 ft. above flat, 3 ft. above ridge. Flues over 150 sq. in. to be 8 ft. above roof	64 sq. in. min. for unlined. Lined flue covered by table of sizes	20	Covered	30 If gas heat distance reduced ½. If thermostatically controlled distance reduced ½. Casing top covered, 1"	40b. If thimble over 12" long, must have 1" in-combustible cover	50a, 50b	90 lb. bright tin or G.I. 28 ga. up. All pipe joints to be stripped with asbestos paper 2½" wide	60	90 lb. bright tin or G.I. covered with 1 layer 10 lb. asbestos paper. Double stacks optional; no paper needed
Colorado	Denver	Yes	—	— No	Data —	—	Denver Code says: "Warm	ys: "Warm	Air Ducts and	d Appurtenan	ces shall be de	signed and insta
Alabama	Anniston	Yes, 1928	2	10	—	Covered	—	Thimble 12" larger in dia. than pipe, or 9" of masonry	No wood closer than 9"	Not specified	Pipes closer to wood than 6" to be covered with ½" corrugated asbestos	Not covered
Ohio	Dayton	Yes	Covered in B	uilding Code.	(No Data)	—	All warm air sys	tems designed	and installed	in accordance	with Standar	d Code
Kentucky	Louisville	Yes	2	If single brick must be lined throughout	20	Covered	All warm air sys	tems designed	and installed	in accordance	with Standar	rd Code
Ohio	Cincinnati	Yes	Covered in B	uilding Code.	(No Data)	—	Gravity warm a	ir systems to	"follow" Stan	d Code. No	data on enfo	rcement
Indiana	Indianapolis	Yes	Covered in B	uilding Code.	(No Data)	—	Practically Stan	d Code incor	porated in	building ordi	nance	—
Ohio	Akron	Yes	Covered in B	uilding Code	or Standard	Code	Gravity warm a	ir systems go	verned by Sta	ndard Code	—	—
Florida	Tampa	Yes	No data	Covered in Bldg. Code	No data	Covered in Bldg. Code	No data	No data	No data	No data	Pipes must be 6" below wood or protected by plaster or metal or pipe covered with ½" corrugated asbestos	Stacks to be 5 ft. from furnace and double pipe or covered with ½" corrugated asbestos

1—Chimney must extend 4 ft. above roof or 2 ft. above nearby roof.

2—Chimney must extend 3 ft. above roof or 2 ft. above nearby roof.

3—Chimney must extend 5 ft. above flat roof or 2 ft. above ridge.

4—Chimney must extend 3 ft. above flat roof; 2 ft. above ridge; must be as high as any roof within 12 ft. or 2 ft. higher than any roof within 5 ft.

A—Although no ordinance is in force, forced air installations must meet requirements of "Mechanical Warm Air Furnace Heating Systems in Residences," 3rd Edition.

10—Chimneys having areas more than 260 sq. in. to be 8½ in.; must be lined with terra cotta or fire clay for entire height; must have 4 in. of masonry between flues.

20—All lined chimneys must have approved thimble, smoke tight, installed when chimney is built; no later openings to be made without special permit.

30—Top of furnace cannot be closer than 12 in. to wood unless protected.

31—Wood closer to top than 12 in. must be protected by ceiling of



light of recent research, be greatly improved or made more comprehensive.

So far as actual design and installation regulations are concerned, those ordinances publicised in AMERICAN ARTISAN are by far the most complete and up to date and will best serve as guides to future code preparation. Just how far any proposed code

should go, depends upon the desire of the trade to protect the public and to raise the overall standards of gravity and forced air work.

It is impossible, within the space limitations of a table of this type, to give complete data, but from codes on file we shall be glad to furnish more specific regulations.

DESIGN AND INSTALLATION—GRAVITY						Is There a Building Inspector?	Is Permit Required to Do New Work?	Is Permit Required to Do Repair Work?	Is There a Code Covering Forced Warm Air Heating?	Forced Air Code Remarks?	Are Heating Contractors Licensed?	Has There Been Any Movement to License?
Cold Air Source	Cold Air Quantity	Cold Air Pipe Construction	Warm Air Pipe Size Determination	Specifications Covering Furnace Size Rating	Register and Box Specifications							
	At least 20% greater than W. A. supply. Grilles to be 10% greater than connecting duct	80, can use 30 ga. Full pipes to be 26 ga.	Standard Code	U. of I. furnace rating formula plus 10% above total warm air leader area	Standard Code	Yes	Yes	No	No	—	No	—
Recirculated or outside or both; 70	Must equal W. A. supply area. For all outside air, area to be 80% of W. A.	Metal, tile, incombustible material, 80. Cross joist C. A. can have wood sides and G. I. top and bottom	Standard Code. Code has special Table A of wall factors	Code has specifications for furnace metal gauges and weights, casing air space. Also gas or oil construction. Size by standard code rating formula	Stack stud spaces must be 2"x6". All fittings to be 90 lb. tin or G.I. covered with 10 lb. asbestos paper	Yes	Yes. If designed to code must show full data sheet. Systems can be installed not according to code with owner's written order. 100	Yes, except for "maintenance". \$3.00 fee for new or replacement. \$2.00 for new non-code. \$1.00 for repair under \$50.00. \$1.50 above \$50.00	Not to our knowledge	—	No	No
lined in accord	ance with Sta	ndard Code of	N. W. A. H. and	A. C. Assn., 8th	Edition	Yes	No	No	No		Only as contractors at \$10.00 a year	
Not covered	Not covered	Incombustible material	Not covered	Not covered	Registers set in wood must have 2" border of incombustible material. Double boxes or covered 1" asbestos	Yes	Yes	Yes	No	—	No	—
—	—	—	—	—	—	Yes	Yes	Yes	No	—	Yes, \$75.00 per year	Code published in A. A. Sept. '35
—	—	Permits wood	One factor (60) used in place of Table A	—	—	Yes	Yes, \$1.00 plus 25c for each register; 100	No, if system is not altered	No	—	No	
—	—	—	—	—	—	Yes	No Data	No Data	No	—	No	—
—	—	—	—	—	—	Yes, City Engineer	No Data	No Data	No	Code being prepared Nov., 1937	No	—
—	—	—	—	—	—	Yes	Yes, up to 400 sq. in. leader area, \$2.00. 401 to 600 sq. in. \$3.00. Over 601 sq. in. \$4.00. 100	Yes, \$2.00	No	—	Yes, \$30.00 for license, \$5.00 a year for renewal	
Not specified	Not specified	Incombustible material only	Not specified	30	Registers in wood to have 2" border incombustible material. Boxes to be double (1") or covered with 1/8" asbestos	Yes	No Data	No Data	No	Code being prepared Nov., 1937	No	—

incombustible material or cement plaster on metal lath extending 18 in. beyond heater.

32—No furnace casing to be closer to wood than 6 in. Top must be covered with sand or have air space above shield.

33—No casing to be closer to wood than 18 in. unless protected by shield extending 6 in. beyond casing plus 2 in. air space above shield. No casing closer to wood than 8 in. allowed in any case.

40, a—Pipe must be surrounded by 4 in. hard, incombustible material.

40, b—Pipe must have double safety thimble of two concentric rings at least 1 in. apart.

50, a—Minimum distance between smoke pipe and woodwork—For pipes 12 in. or less, 12 in.; for pipes over 12 in., 20 in.

50, b—Where woodwork is protected by incombustible shield measuring 1½ times pipe diameter and having 1 in. air space between shield and wood, distance may be reduced one-half.

60—Pipes shall not run closer to wood than 1 in. unless covered with one thickness of 12 lb. asbestos paper.

61—Same specification as (60) except covered with tin on paper or ¼ in. of air cell.

62—Pipe shall not run closer to woodwork than diameter of pipe, nor closer to ceiling than 1½ diameters of pipe. This can be reduced one half if wall or ceiling is covered with ¼ in. asbestos board or equal.

70—Air cannot be taken from any basement space unless such space is used as living quarters.

80—Returns between joists can be built as G. I. pan nailed across bottoms of joists. Duct need not be completely metal.

100—Inspection must be made when furnace is set and stacks connected and before any plastering is done over pipes. Final inspection to be made when system is ready to run.

200—Pipe size obtained by dividing cubic content by 1,000.

300—Factors from Table A increased approximately 20 to 33½ per cent.

350—Failure to renew annual license within 60 days after expiration means new examination and \$25.00 fee.

State	City	General Building Code and Date of Last Revision	CHIMNEY CONSTRUCTION				FIRE PROTECTION			MATERIALS		
			Chimneys, Height	Chimney Construction	Openings Into Lined Flues	Framing at Chimneys	Woodwork Near or Over Furnace	Smoke Pipes Thru Wood Construction	Woodwork Near or Over Smoke Pipes	Materials of Warm Air Pipes	Insulation of Warm Air Pipes	Wall Stacks, Material and Insulation
Minnesota	Minneapolis	Yes, 1936	Complete table in code	Covered in code. Must pass smoke test	Covered in building code	Covered in building code	30, 31	40a, 40b	50a, 50b	Standard code	Near wood pipes to be insulated by 1 layer 12 lb. asbestos paper	Standard code
Indiana	Ft. Wayne	Yes, 1937	Covered completely in Building Code	—	—	—	Standard Code	incorporated in Ordinance	for gravity	—	—	—
Ohio	Elyria	Yes, Feb. 17, 1936	1	10	20	Fully covered	30, 31	40a, 40b	50a, 50b	Bright tin or G. I.	60	Tin or G.I. with 1 thickness of asbestos paper
Orego.	Salem	Yes, April 1, 1935	8"x12" flue is minimum	—	20	Fully covered	32	—	50a and 50b, but 18" and 2 times pipe diameter	Bright tin, IX or G.I., 26 gauge, up	40b	Tin or G.I. with 1 thickness of asbestos paper. Stack openings thru floor must be insulated
Iowa	Des Moines	Yes, June, 1934	1	3½" Min. 78 sq. in. min. area	20; 7 ga. min. min.	Covered	30, 31 except 6" beyond furnace; 32	Not permitted	50a, 50b, but twice dia.	I.C. tin or G.I., 26 ga. up	61	I.C. tin or G.I. double wall only
New Jersey	Montclair	Yes, Jan., 1936	1	—	20	Covered	Plenum not closer to wood than 2" with 1" air cell or equal	40a, 40b	50a, 50b	Mains and branches G.I. only, 28 ga. up	60	Stacks of single or double wall, IX tin or G.I., 28 ga. up
Ohio	Toledo	Yes	2; 8" dia. min. for hard coal; 10" for bituminous	Must have flue lining entire height	20	—	33	—	50a, 50b, but 18" and 2 times pipe dia.	I.C. tin or G.I., 28 ga. up	60	Tin or G.I. Must be double wall
Wisconsin	Neenah	Yes, Feb., 1934	3	—	—	Covered	31	40a, 40b	62	I.C. tin or 27 ga. G.I.	Pipe thru or near wood must be covered with ½" asbestos	—
Illinois	Chicago	Yes, April 1, 1928	In General Building Code, now being revised	—	—	—	Standard Code, incorporated into Ordinance	—	—	—	—	—
Wisconsin	Green Bay	Yes, April 1, 1928	3	8" plain, or 4" with liner, 8"x12" min. area	—	Covered	30, except 24"; 31	40a, 40b	50a, but 8" min.	1	61, 40b	Not covered
Utah	Salt Lake City	Yes	—	—	Standard Code	Covered	Standard Code	incorporated into Ordinance	—	—	—	—
Iowa	Sioux City	Yes, Jan., 1936	Must extend above roof	Must be lined with ¾" tile. 25% over smoke pipe area	20	Covered	Standard Code	with minor changes incorporated into Ordinance	—	—	—	—
Ohio	Warren	Yes, 1928	2	10	—	—	31	40a, 40b	50a, but 18" min.	Not specified	60	Not specified
California	Los Angeles	Yes, March, 1937	Covered in Gen. Bldg. Specifications	Same as chimney height	No specifications available	No specifications available	Furnace must be in room with 48 sq. ft. of floor area, 7 ft. ceiling. Furnace exterior to be not more than 90° above room temp. 5 ft. from furn. after 1 hr. operation	See warm air pipes	See warm air pipes	Not covered	62 except 2 ft. May be 12" if all surfaces insulated by 1½" metal furring covered with 20 ga. G.I. or ½" asbestos	All lateral pipes must be covered with air cell ¼" thick. Stacks and fittings shall be covered with 2 thickness asbestos paper, cemented
Pennsylvania	Pittsburgh	Yes, June, 1930	2	79 sq. in. min. area, ¾" lining. No other openings	Not specified	Covered	33	—	50b	IX tin or G.I.	60	I.C. tin, double only

DESIGN AND INSTALLATION—GRAVITY						Is There a Building Inspector?	Is Permit Required to Do New Work?	Is Permit Required to Do Repair Work?	Is There a Code Covering Forced Warm Air Heating?	Forced Air Code Remarks	Are Heating Contractors Licensed?	Has There Been Any Movement to License?
Cold Air Source	Cold Air Quantity	Cold Air Pipe Construction	Warm Air Pipe Size Determination	Specifications Covering Furnace Size Rating	Register and Box Specifications							
Standard Code	Standard Code	Standard Code	Standard Code by floor formula	Yes, Standard Code	Standard Code	Yes	Yes	Yes	Yes, also includes gas, oil heating and air conditioning	Complete Warm Air Code published in A. A.	Yes	
—	—	—	—	—	—	Yes	Yes	Yes	Yes, also includes air conditioning, gas, oil, stokers	Complete code being published in A. A.	Yes	
Recirculated or outside or both; 70	Must equal W. A. supply	Metal, tile, incombustible materials; 80, transition to drop required	—	—	—	Yes	Yes, amount according to cost	Yes, except where system is not changed \$1.50	No	Forced Air Code is favored when N. W. A. H. & A. C. Assn. proposes such a code	No	Some talk
Recirculated or outside or both; 70	Must equal W. A. supply	Metal, tile, incombustible materials; 80, transition to drop required	Standard Code specifications; 200; 300	Yes, Standard Code, plus rating for gas furnaces	All boxes must be insulated with 1 layer air cell if in outside wall	Yes	Yes, \$1.50 for furnace; \$1.25 for each register; 100	Yes, \$1.50 for furnace; \$1.25 for each register; 100	Yes, with specifications for furnace size, cfm, register, size, velocity, blower capacity, dampers	Both codes contain specifications covering furnace construction	No	—
Recirculated or outside or both; 70	Must equal W. A. supply. Outside to equal 80% W. A. supply	Metal, tile, incombustible materials; 80, transition to drop required	Standard Code, but factors of 10.3 (first floor); 6.9 (2nd floor); 5.7 (3rd floor)	Yes, sq. in. grate area times 1.75 for 20 to 1 ratio	All boxes must be insulated with asbestos cement. If in outside walls must be insulated. All boxes must be double wall	Yes	Yes, \$1.00 for furnace; \$1.25 for each opening; oil burner, stoker, blower \$1.50 each	Yes, same schedule as for new work	Yes, with specifications for W. A. pipe size; blower size; furnace size	F. A. Code very brief and elastic. Code also governs oil burners, gas burners, stokers	No	—
Standard Code	Standard Code	Full stacks, panned joist space. Transition to drop required	Standard Code	Standard Code	—	Yes	Yes	?	Yes	F. A. Code based on Standard Code	No	—
Recirculated or outside or both; 70	Must equal W. A. supply	Metal, tile, incombustible materials; 80. Require transition to drop	Standard Code	Furnace to be 25% over actual heat loss	Tin or G. I. Must be double wall. Registers must be sealed	Yes	Yes, \$3.00 up to 75,000 Btu. \$1.50 for each additional 25,000 Btu.; 100	Yes, \$2.00	No	F. A. Code in making	Yes, License fee \$25.00 and \$10.00 annual renewal; 350	
—	—	—	—	—	—	Yes	Yes	Yes	No	—	No	—
—	—	—	—	—	—	Yes	Yes, \$5.00 each furnace; 100	Yes, \$5.00 each job above minor repairs which do not change system. New register or run—\$1.00 an outlet	No		Yes, must be registered. Must furnish indemnity bond, \$10,000. Registration fee \$25.00 for license, \$10.00 per year renewal	
Not covered	Not covered	Not covered	Not covered	Not covered	Not covered	Yes	Yes, 100	Yes, \$1.00 per job	No	—	No	—
—	—	—	—	—	—	Yes, City Engineer	Yes	Yes	Yes; A		No	Some Contractors favorable
—	—	—	—	One sq. ft. exposed radiation surface above fire pot for each 500 cu. ft. cubic content and 1 sq. ft. of free air passage for each 3,000 cu. ft. contents	According to Standard Code	Yes	Yes, \$1.50 for each furnace; \$1.25 for each register; \$1.00 min. amount; 100	Yes, same rate as new work	No	Inspector reported Feb. 1936, new code ready for legal department	No	Interest increasing
Recirculated or outside or both	Not specified	Not specified	Not specified	No	None	Yes	Not heating	Only for general contract	No	—	No	—
See cold air quantity	Outside supply only. 400 sq. in. for gravity; 100 sq. in. for F. A. In F. A. must also be direct duct from blower to outdoors, or basement	—	Gravity heat pipe sized by dividing space served by 40. 38 sq. in. to be minimum. For fan system 5 air changes per hour	Yes, with particular attention to gas equipment	Same insulation as leader pipes	Yes	Yes; 100	Yes	Yes	Also, very complete regulations for recessed heaters	No	No Report
Recirculated or outside or both; 70	At least 10% greater than W. A. supply	Metal, tile, incombustible material; 80	Standard Code	Standard Code formula	Standard Code	Yes	Yes, \$5.00	Yes, \$1.00 up according to work	No	Inspectors have own interpretation of code for F. A.	No	Sporadic efforts to arouse interest

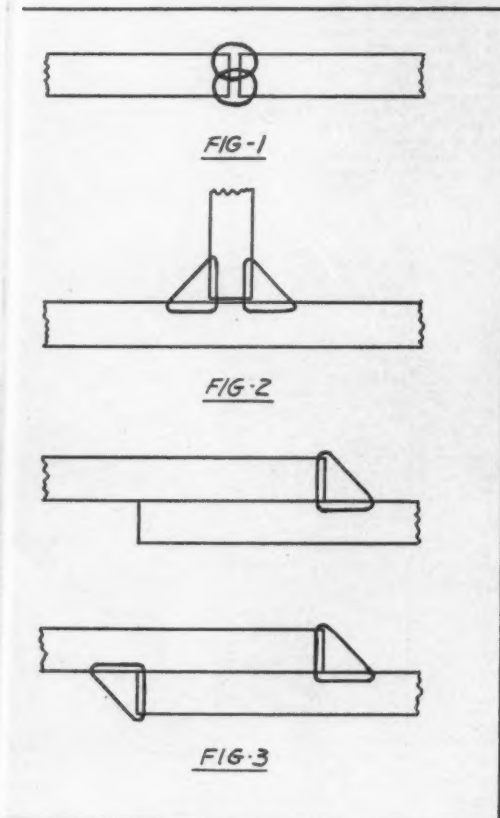


# ARC WELDING

## Selecting and Placing Welds

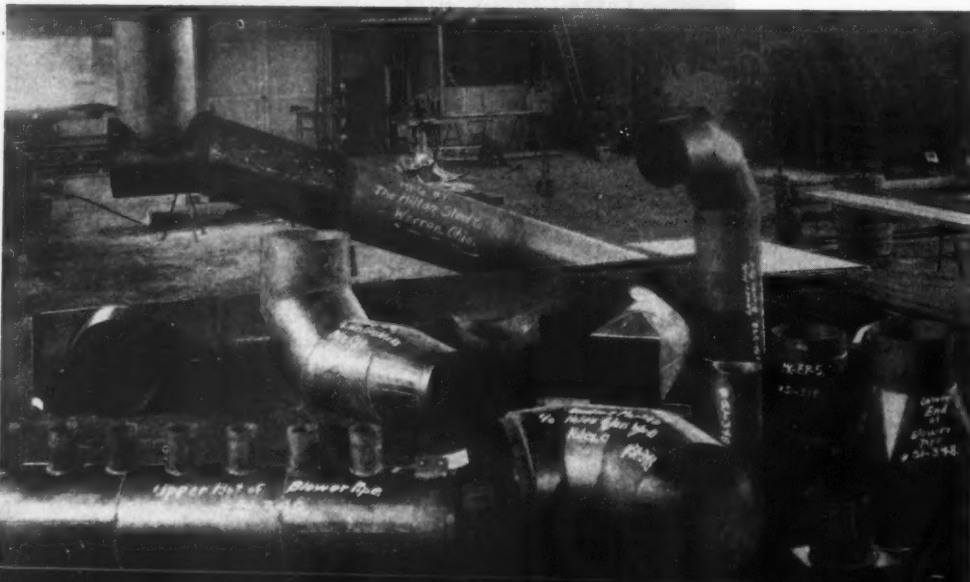


Fig. 8—Miscellaneous sheet metal fittings made by welding.



From top to bottom: Fig. 1—Plain butt joint. Fig. 2—Tee joint. Fig. 3—Lap joint; left—single bead, right—double bead.

Fig. 9—Piping fabricated of 20-gauge blue annealed sheet metal, arc welded.



**E**LECTRIC welding has enabled manufacturers of practically every type of product, made of metal, to increase their profits by reducing production costs and increasing service life. Electric welding is an economical manufacturing process because of its remarkable simplicity; it joins any number of pieces of metal directly together into what is virtually a single unit as strong where joined as the metal itself.

The effect of this simplicity on cost reduction, where the method replaces others which are more complicated, can be appreciated. There is an immediate saving in materials through elimination of connecting members. There is a saving in designing and detailing. Handling of materials is reduced. Machining is lessened since metal can be placed exactly where wanted and in the amount needed. Another advantage is the saving in production time.

As is true of every other method of doing work, the greatest advantage is obtained with electric welding only when the process is used most efficiently. Most efficient use presupposes obtaining a desired result at minimum cost.

Inasmuch as electric welding is a process of joining metals together, the various cost factors entering into doing the joining should be carefully considered. It is not the purpose of this article to consider all factors, but to discuss various types of joints and the factors which make some types more costly than others.

The first consideration in selecting the type of joint is, of course, the question of what the joint is required to do. If it is merely for the purpose of connecting two pieces of metal together it is one thing. If the requirement is for a joint of greatest possible strength, it is another thing. The problem is, therefore, to know the requirement exactly and to meet

By A. F. Davis

Secretary, The James F. Lincoln Arc  
Welding Foundation

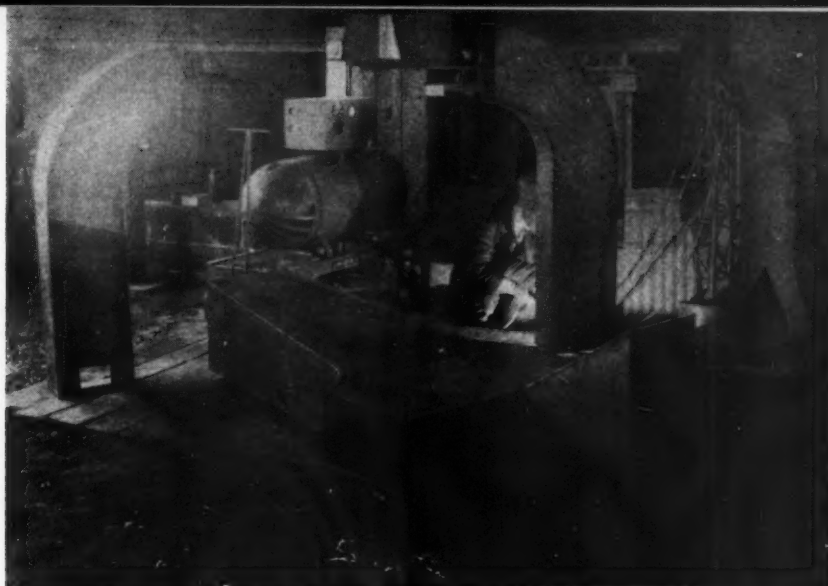


Fig. 7—Steel ducts fabricated of 18-gauge sheet metal by electric welding.

it. If requirements are met by several types of joints the one which costs least should be used.

A little analysis of the various operations which affect the cost of a joint will show why one type costs less than another. It will be noted that the difference lies in the amount of labor required for joint preparation, welding and finishing.

When two plates are to be joined together, the joint may be one of five types; butt, tee, lap, corner and edge. Butt and tee joints can be either plain, single V, double V, single U or double U. The single and double V, single and double U butt and tee joints are used most generally in joining the heavier thicknesses of plate. They are practically never used in sheet metal work. Lap joints can be single or double bead. Corner joints can be flush, half open or full open. The edge joint is, obviously, of only one type.

All that is required, in the case of the plain butt joint, is a matching of the edges of the plates or sheets being joined. (See Fig. 1.)

The plain tee joint, or fillet weld, Fig. 2, is even simpler, since for all practical purposes the preparation is confined to the end of the vertical plate.

In the case of the lap joint, Fig. 3, that is, where two plates are to be joined with ends overlapping instead of butting, there is practically no machining and therefore a minimum of labor in preparation. Preparation is the same whether single bead or double bead is used. The cost of the lap joint will depend on whether a single or double bead is used. Obviously if the single bead meets requirements it would be only adding cost to use the double bead.

With corner joints, Fig. 4, there is no difference in the labor of preparing the plates whether the joint is flush, half open or full open. Only square cuts are needed.

The edge joint, Fig. 5, entails a minimum of preparation, a fact readily appreciated.

(Continued on Page 182)

Fig. 4—Corner joint; left—flush; middle — half open; right—full open. Fig. 5—Edge joint.

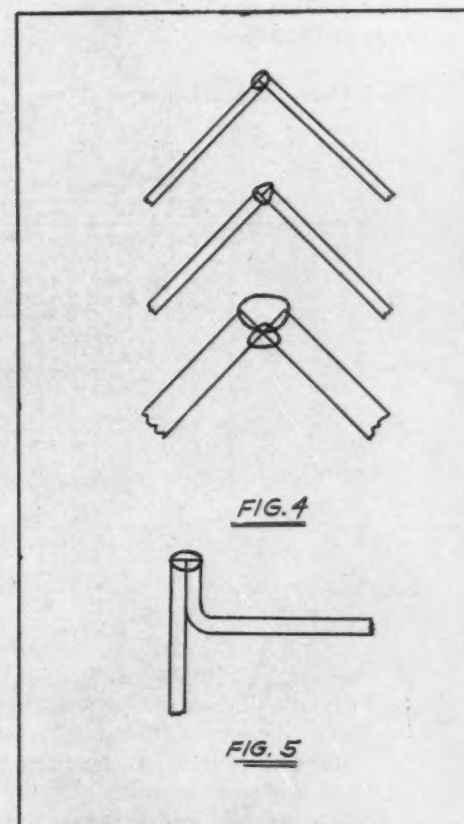


Fig. 8—Straight sections of work shown in Fig. 7.



# Profit and Loss Records of Philadelphia Shops

By Fred U. Ritter  
and  
B. F. John

Monthly  
Sales Summary  
from book  
"Easy Bookkeeping"  
by Fred U. Ritter

Fig. 1 above; Fig. 2 below.

SALES SUMMARY January 1930

Job Record No.	MATERIAL	PRODUCTIVE LABOR	OVERHEAD	EXPENSE	LOSS	SELLING PRICE
649	109	3373	3373	7837	1959	7994
650						
651						
652						
653						
654						
655						
656						
657						
658						
659						
660						
661						
662						
663						
664						
665						
666						
	6755	60926	60926	128478	37259	274232
	Material + Labor + Overhead = Cost + Profit = Loss = Total					274232

copy the summary of each Job Record sheet for the month and place the amounts therefrom into their respective columns

at the end of week or month add each column

A FEW years prior to 1909, a group of Philadelphia shop owners agreed to separate the various costs in their books for several years thereafter and compare these costs with their Total Sales and with one another for the purpose of arriving at a simple, yet accurate, method of adding the yearly expense properly to the bills.

The reason for such a program was that the Sherman Anti-Trust Law prohibited, or so it was decided, the continued use of the Philadelphia "Piece Price List," which had been printed and issued each year. This price list contained a sales price for every kind of material as well as a sales price for labor by the hour and found favor generally among the trade, even among non-members. Another reason for the search was the many requests for a fair price by the foot, per square foot and pound, which had become the vogue, and the increasing demand for estimates on all sizes of jobs.

The several shops used three methods to add expense for estimating and making out bills, viz.:

1. Expense as a percentage of Productive Labor cost;
2. Expense as a percentage of Material and Productive Labor cost;
3. Expense as a percentage of Total Sales for the year.

In other words, the expense was to be added to each bill or estimate as a percentage of the cost selected; the percentage to be arrived at by a comparison of the year's expense with any of the three totals shown above for the year.

By 1912, the Overhead Expense Committee concluded that in various sized shops it was possible to greatly simplify the accurate figuring of estimates and bills by this method and recommended for the average jobbing shop the method of finding the expense by using a percentage of productive labor. In their judgment productive labor increased and decreased more regularly with the business done from year to year.

From previous statements it was found that when exact cost was compared with the amount charged the loss sustained was generally on all three items—Material—Labor—Overhead. Gradually, as the new method was adopted, the loss on material and labor charged decreased and by 1928 there were but few statements of the more than one hundred reported that showed a loss on these two costs—Material, Labor, due largely to a more general use and careful entries made on the Job Sheet.

From about 1928 the additional use of the Sales Summary Sheet (Fig. 2) as a check each week or month by the addition of the EXPENSE CHARGED for the month and a comparison against the monthly expense (usually figured as 1/12th of the year's expense) made it comparatively easy to know just what must be done to properly distribute all the expense. If the expense was not returned in any month, then following months must bear a greater percentage and this could be added during any busy periods when jobs were easier to obtain and price was not such a controlling factor. With several years' experience showing the percentage added for Overhead expense, both in busy and lean

STATEMENT NO. 5	
Total Yearly Sales	\$30,864.60
COST (from books)	\$11,372.89
(a) Material	
STATEMENT NO. 8.	
1936	
Total Sales	\$15,125.98
COST	



STATEMENT NO. 8. 1936		STATEMENT NO. 5	
Total Sales .....		Total Yearly Sales .....	
Material, from books.....		COST (from books)	
Labor from books.....		(a) Material .....	
Overhead Expense .....		(b) Labor .....	
NET PROFIT .....		(c) Overhead .....	
		NET PROFIT .....	
SALES SUMMARY		SALES SUMMARY	
Material, chgd. on sheets.....		(Charged on Job Record Sheets)	
Labor chgd. on sheets.....		(g) Material chgd. ....	
Overhead chgd. on sheets.....		(h) Labor chgd. ....	
Profit added to sheets.....		(i) Overhead chgd. ....	
Less Losses on sheets.....		(j) Profit added to sheets.....	
Total Sales .....		(k) Less losses on sheets.....	
PROFIT		PROFIT	
Profit added to sheets.....		(How made and partly lost)	
Losses on sheets.....		(m) Profit added to sheets (j).....	
Material chgd. on sheets.....		(n) Losses on sheets (k).....	
Material cost ledger.....		(o) Material, chgd. on sheets (g).....	
Labor, chgd. on sheets.....		(p) Material cost (books) (a).....	
Labor cost .....		Profit accumulated .....	
Overhead Expense chgd. sheets.....		LOSSES	
Overhead Expense Cost on Ledger.....		(q) Labor, cost on books (b).....	
NET PROFIT .....		(r) Labor, chgd. on sheets (h).....	
		Loss .....	
		(s) Overhead Expense (books).....	
		(t) Overhead chgd. ....	
		Loss .....	
		NET PROFIT .....	
		(A lot of money passed through this shop without much remaining there.)	
STATEMENT NO. 7		STATEMENT NO. 6	
Total Years Sales.....		Total Years Sales.....	
COST		COST (from books)	
(a) Material .....		(a) Material .....	
(b) Labor .....		(b) Labor .....	
(c) Overhead .....		(c) Overhead .....	
NET PROFIT .....		NET PROFIT .....	
SALES SUMMARY		SALES SUMMARY	
(g) Material charged .....		(g) Material (chgd. on sheets) .....	
(h) Labor (chgd. on sheets).....		(h) Labor (chgd. on sheets).....	
(i) Overhead (chgd. on sheets).....		(i) Overhead (chgd. on sheets).....	
(j) Profit added .....		(j) Profit added to sheets.....	
(k) Losses .....		(k) Losses on sheets .....	
		Total Sales .....	
		PROFIT	
		(How made and partly lost)	
(m) Profit added to sheets (j).....		(m) Profit added to sheets (j).....	
(n) Less Losses on sheets (k).....		(n) Less losses on sheets (k).....	
(o) Material chgd. on sheets (g).....		(o) Material chgd. (g).....	
(p) Material Cost (a).....		(p) Material cost (a).....	
(r) Labor chgd. (h).....		(r) Labor chgd. (h).....	
(q) Labor Cost (b).....		(q) Labor cost .....	
		Total Sales .....	
		LOSSES	
		(s) Overhead Expense COST (c).....	
		(t) Overhead Expense chgd. sheets (i).....	
		NET PROFIT .....	

## STATEMENT NO. 1

Total Year's Sales.....\$ 7,699.72

## COST

(a) Material (from Ledger ac.).....\$ 2,276.17  
 (b) Labor (from Ledger ac.).....1,970.53  
 (c) Overhead Exp. (from Ledger ac.).....2,875.03

7,121.73

(d) NET PROFIT (from books).....\$ 577.99

(e) Percent Overhead on Labor 140%.....\$ 577.99

(f) Or Percent Overhead on Labor and Material 68%.....\$ 577.99

## SALES SUMMARY

(Additions from Job Record Sheets, see Figs. 1 and 2)

(g) Material as charged on sheets at cost.....\$ 2,551.00  
 (h) Labor as charged on sheets at cost.....1,963.23  
 (i) Overhead as charged on sheets at cost.....1,963.23

(j) Profit added to sheets.....\$ 6,477.46

(k) Losses, on contract sheets.....\$ 1,227.36

(l) Add for discount earned.....34.90

(m) Profit added to sheets.....\$ 7,669.92

(n) Less losses on sheets.....1,192.46

(o) Material charged on sheets.....\$ 1,192.46

(p) Material actual cost, from books.....\$ 2,276.17

(q) Labor cost, from books.....\$ 1,970.53

(r) Labor charged on sheets.....1,963.23

(s) Overhead Expense, from books.....\$ 2,875.03

(t) Overhead Expense added to sheets.....1,963.23

(u) Add for discount earned.....919.10

(v) Net Profit.....\$ 548.19

(w) Actual profit asked or added to sheets.....\$ 1,227.36

(x) Actual profit by the books.....\$ 577.99

(y) Profit lost as above.....\$ 649.37

(z) Profit lost as above.....\$ 649.37

(aa) Profit lost as above.....\$ 649.37

(ab) Profit lost as above.....\$ 649.37

(ac) Profit lost as above.....\$ 649.37

(ad) Profit lost as above.....\$ 649.37

(ae) Profit lost as above.....\$ 649.37

(af) Profit lost as above.....\$ 649.37

(ag) Profit lost as above.....\$ 649.37

(ah) Profit lost as above.....\$ 649.37

(ai) Profit lost as above.....\$ 649.37

(aj) Profit lost as above.....\$ 649.37

(ak) Profit lost as above.....\$ 649.37

(al) Profit lost as above.....\$ 649.37

(am) Profit lost as above.....\$ 649.37

(an) Profit lost as above.....\$ 649.37

(ao) Profit lost as above.....\$ 649.37

(ap) Profit lost as above.....\$ 649.37

(aq) Profit lost as above.....\$ 649.37

(ar) Profit lost as above.....\$ 649.37

(as) Profit lost as above.....\$ 649.37

(at) Profit lost as above.....\$ 649.37

(au) Profit lost as above.....\$ 649.37

(av) Profit lost as above.....\$ 649.37

(aw) Profit lost as above.....\$ 649.37

(ax) Profit lost as above.....\$ 649.37

(ay) Profit lost as above.....\$ 649.37

(az) Profit lost as above.....\$ 649.37

## STATEMENT NO. 2

Total Sales.....\$16,476.39

## COST

(a) Material (from books).....\$ 5,010.67  
 (b) Labor (from books).....5,066.61  
 (c) Overhead (from books).....5,877.71

(d) NET PROFIT.....\$15,954.99

\$ 521.40

## SALES SUMMARY

(g) Material charged on jobs.....\$ 5,032.27  
 (h) Labor charged on jobs.....5,046.13  
 (i) Overhead charged on jobs.....3,412.05

(j) Profit.....\$13,490.45

(k) Loss.....\$ 3,261.09

(l) Total sales.....2,985.94

(m) Profit added to sheets.....\$16,476.39

(n) Less Losses.....2,985.94

(o) Material charged on sheets.....\$ 5,032.27

(p) Material cost from Ledger.....\$ 5,010.67

(q) Labor cost from Ledger.....\$ 5,066.61

(r) Labor charged on sheets.....5,046.13

(s) Overhead cost.....\$ 5,877.71

(t) Overhead charged.....3,412.05

(u) Loss.....20.46

(v) Profit Lost.....\$ 2,739.69

(w) OVERHEAD NOT CHARGED.....\$ 2,465.66

(x) Asked on sheets.....\$ 3,261.09

(y) Net Profit.....\$ 521.40

(z) Profit Lost.....\$ 2,739.69

(aa) OVERHEAD NOT CHARGED.....\$ 2,465.66

(ab) Asked on sheets.....\$ 3,261.09

(ac) Net Profit.....\$ 521.40

(ad) Profit Lost.....\$ 2,739.69

(ae) OVERHEAD NOT CHARGED.....\$ 2,465.66

(af) Asked on sheets.....\$ 3,261.09

(ag) Net Profit.....\$ 521.40

(ah) Profit Lost.....\$ 2,739.69

(ai) OVERHEAD NOT CHARGED.....\$ 2,465.66

(aj) Asked on sheets.....\$ 3,261.09

(ak) Net Profit.....\$ 521.40

(al) Profit Lost.....\$ 2,739.69

(am) OVERHEAD NOT CHARGED.....\$ 2,465.66

(an) Asked on sheets.....\$ 3,261.09

(ao) Net Profit.....\$ 521.40

(ap) Profit Lost.....\$ 2,739.69

(aq) OVERHEAD NOT CHARGED.....\$ 2,465.66

(ar) Asked on sheets.....\$ 3,261.09

(as) Net Profit.....\$ 521.40

(at) Profit Lost.....\$ 2,739.69

(au) OVERHEAD NOT CHARGED.....\$ 2,465.66

(av) Asked on sheets.....\$ 3,261.09

(aw) Net Profit.....\$ 521.40

(ax) Profit Lost.....\$ 2,739.69

(ay) OVERHEAD NOT CHARGED.....\$ 2,465.66

(az) Asked on sheets.....\$ 3,261.09

(ba) Net Profit.....\$ 521.40

(bb) Profit Lost.....\$ 2,739.69

(bc) OVERHEAD NOT CHARGED.....\$ 2,465.66

(bd) Asked on sheets.....\$ 3,261.09

(be) Net Profit.....\$ 521.40

(bf) Profit Lost.....\$ 2,739.69

(bg) OVERHEAD NOT CHARGED.....\$ 2,465.66

(bh) Asked on sheets.....\$ 3,261.09

(bi) Net Profit.....\$ 521.40

(bj) Profit Lost.....\$ 2,739.69

(bk) OVERHEAD NOT CHARGED.....\$ 2,465.66

(bl) Asked on sheets.....\$ 3,261.09

(bm) Net Profit.....\$ 521.40

(bn) Profit Lost.....\$ 2,739.69

The statements shown have been selected by the authors as typical of shops with volumes ranging from \$7,000 to \$40,000. This range includes most job shops of the area, but excludes shops catering specifically to very large contracts. Further, these statements have been paired to show excellent and not-so-good statements of two shops with approximately equal volume. The statements are detailed enough to see just where money was made or lost.

months, any shop owner could adjust the amount added for expense monthly to balance the predetermined yearly expense.

Each year since 1928, the February meeting of the Roofing, Metal and Heating Engineers Association has been set aside to show on the screen, in large figures, as many as possible detailed statements for the previous year from the shops around Philadelphia, ranging in total business from \$7,000 to \$100,000.

These statements were taken from the balanced books by the Secretary, Fred U. Ritter, who is an accountant and as the business consultant of a number of shops is intimately acquainted with each shop's "set up" and procedure. He is also the author of a set of books and forms especially adapted to the roofing, sheet metal and warm air heating, jobbing shop.

The procedure is based upon years of experience in the shops and is fitted to their need; easily understood by the owner; simple, yet including all the principles of proper accounting.

The balancing of these books has now become a matter of monthly routine in most of the 100 and more shops where installed. In a number of the shops, young men and women or a relative are keeping these books straight and "licking" Mr. Overhead more and more each year. These young people, by their persistent control of the overhead and its distribution in the right proportion, and by checking overhead each month, have earned more profit for the shop than anyone else connected with it.

#### Theoretical Operation

The explanation of Statement No. 1 follows in detail:

In Statement No. 1, the Total Sales and Items "a-b-c-d" were taken from the Ledger pages of the same names and represent the actual cost of the jobs finished during the year 1936. These items show that a Net Profit of \$577.99 was made, after the books were balanced and a check made of the shop's resources with the previous year.

The items "g-h-i-j-k" are the totals of the separate costs and profit as actually added on the JOB RECORD SHEETS (see Fig. 1) from which the bills are made, and recorded each month on the SALES SUMMARY SHEETS. ( See Fig. 2).

The Job Record Sheet is used for every job, large or small, outside or in the shop and even for work about the shop, truck operation and even the shop repairs. The week's sheets thus afford a check against the payroll or time cards and prevents overlooked time. When filed in a two-prong binder through the holes provided, after the job is completed and numbered consecutively, these sheets become an easy and excellent reference in estimating, for it is a well known fact that there are many jobs similar in the course of a year or two. These sheets also contain the whole story of each job. As the original entry, if carefully checked after job is completed, items may be posted direct to the Ledger

and a carbon copy of the bill placed in another binder.

The SALES SUMMARY SHEET (Fig. 2) is merely a list of the separate costs of each job, taken from the job sheets for the month and, with the exception of the Total Sales for the month, the figures are not entered in the Ledger, but are used as a check on the Ledger accounts to insure accuracy. This Monthly Sales Summary has found favor among the shops as it is easily understood, and is an excellent check on Overhead Expense returned by the bills, with the allowable Overhead determined on January 1st.

Items "g-h-i" show the amount charged during the whole year for Material, Productive Labor and Overhead, on the Job Sheets, taken from the 12 monthly Sales Summary Sheets. The Item "j" is the Profit added or asked (\$1227.36), also taken from the Sales Summary Sheets. Item "k" is the loss shown on sheets where the cost exceeded the amount of the Sales Price, or \$34.90. Item "l" is the discount earned by discounting bills in 10 days and used here merely to balance the Total Sales as shown in the Ledger.

#### Actual Results

The items "m to t" under the heading PROFIT show where the profit was made and how part of it was lost. Item "m" (\$1227.36) being the full profit added to the separate sheets for the year; "n" the loss \$34.90 on some sheets. Item "o" is amount for material charged on the sheets at cost and "p" the real cost of the material bought and taken from stock and used on the jobs, as shown by the Ledger. Item "p," when deducted from the material charged, shows an excess charged, which is common in the jobbing shop where the material is used in smaller lots, and therefore is a profit of \$274.83. This amount, added to the Profit Asked (\$1,192.46 plus \$274.83) equals a supposed PROFIT of \$1,467.29.

Under LESS LOSSES, Item "q" is the Labor taken from the Ledger account of the same name, which is the total of all the payrolls for the year, or \$1970.53 from which is deducted the amount of labor charged on the sheets as recorded in the Sales Summary Sheet. This is item "r" or \$1963.23, which was \$7.30 less than paid the men.

Item "s" (\$2875.03) was the real amount charged weekly in the books for Expense for the year, and "t" the expense as charged to the sheets or bills—\$1963.23, which shows that \$911.80 of expense was NOT charged to the bills.

Thus the \$7.30 lost on labor plus \$911.80 lost on expense equals \$919.10 which, deducted from the full profit realized, shows the Net Profit of \$548.19 plus discount earned \$29.80 equals \$577.99 as shown by the balanced books.

The other statements may be followed through by the explanation given for No. 1.

The statements show that the loss of profit was due almost entirely to the failure to find the correct amount of Overhead expense at the beginning of

(Continued on Page 184)



# The "Books" of Bookkeeping

By Joseph G. Dingle

C. P. A., Ottawa, Ill.

**I**N our December article, we published a "Chart of Accounts" showing those accounts which, in our opinion, should be used by the typical shop. We now present for consideration the several journals, which we shall discuss in detail. Ledger accounts may be compared with your bins and racks. In planning your shop, you provided bins and racks, each to receive and properly hold certain material. You placed these in the most convenient place, both for accessibility and protection. Your ledger accounts, like your bins and racks, have been designed to hold and accumulate data pertaining to your financial transactions.

Your merchandise comes to you in a more or less segregated form. Your rivets are in boxes, a separate box for each size. Your sheets are received in bundles. But suppose your materials came to you in one grand, conglomerate mess—rivets and bolts of all sizes thrown into a nail keg, sheets dumped indiscriminately off a truck. You could not use them efficiently until you had sorted them, each size and kind in a pile by itself. Then you would place them in bins properly marked to show just what each contained.

Your business transactions come to your bookkeeper in a grand conglomeration—both receipts and disbursements of cash, purchase invoices, charge sales, cost data for the several jobs in progress. These many and varied transactions must, like the keg full of rivets of all sizes and shapes, be sorted—each to its own place, and for this purpose we use journals. The typical business buys, sells, receives and disburses cash, and has frequent occasion to transfer amounts from one internal account to another. Thus, we present separate journals, each designed to best serve a specific purpose.

## Sales Journal

We here illustrate a Sales Journal, which follows the general layout of the journal presented to you in 1930, except that we have provided new columns for Sales of Appliances—(Retail) and (Wholesale). In our discussion of these sales accounts in our December article we explained the two accounts for Sales of Appliances. This journal, then, is a sorting medium, wherein the bookkeeper records all sales, then classifies them as to Material, Labor and Appliances. The totals of all columns are carried for-

ward until the end of the month and we have a compound journal entry covering our sales for the month, thus:

Debit Accounts Receivable—  
Credit Sales of Material.  
Sales of Labor.  
Sales of Appliances (Retail).  
Sales of Appliances (Wholesale).

This journal, as you will plainly see, is a mere sorting and gathering medium for sales and without regard to payment. The sale is here recorded, and even though paid at time of sale, the cash transaction will come through the Cash Journal, to be discussed later.

## Purchase Journal

This journal, also illustrated, is the sorting medium through which all purchases of materials, appliances, and supplies will be recorded. This journal, at the close of each month, is footed and balanced and from the column totals we obtain a compound journal entry, covering the month's purchases, and sorted properly for entry in the ledger accounts, thus:

Debit Supplies—  
Materials.  
Appliances.  
General.  
Credit Accounts Payable.

Here, as in the Sales Journal, we must enter all purchase invoices regardless of the fact that we may have paid one or more during the month. Here we sort our purchases, and the payment, being a cash transaction, will appear in the Cash Journal.

This Journal has two features which we believe require a few words of explanation. The first feature is the two columns headed "General" with columnar headings "Account" and "Amount." These are provided for the purpose of permitting the entry of a purchase invoice covering other than material, appliances or supplies. To illustrate, assume a purchase invoice covering a piece of shop equipment or office furniture. These two columns will provide a means of properly segregating such purchases. Enter the invoice in the usual manner, but instead of charging one of the three specific columns, enter the amount in "amount" column and in "account" column, show the name of the account

## SALES JOURNAL

MONTH OF

193

[illegible]

## PURCHASE JOURNAL

MONTH OF \_\_\_\_\_

193

[illegible]

## GENERAL JOURNAL

MONTH OF \_\_\_\_\_

193

[illegible]

## CASH JOURNAL

MONTH OF \_\_\_\_\_

193

[illegible]

## CASH JOURNAL

MONTH OF \_\_\_\_\_

193

[illegible]

The Editor, who admits he is not a bookkeeper, writes to say that the articles on bookkeeping appeared quite complicated, yet when the editor discussed the articles with his bookkeeper the articles were found to be clear and easily understood. Your bookkeeper can probably render a similar service to you. You may be able to lay out and fabricate a complicated dust flue, but your bookkeeper probably knows more about "debits and credits." Try the Editor's plan and see if your bookkeeper can't help you understand bookkeeping.—J. G. DINGLE.

to be charged. In posting, it is necessary to post each item in this General column separately to the proper account. Of course, if only material be shown in the column headed "Material," we can safely post the column total to the account "Material" at the close of the month.

The second feature of this Purchase Journal which we wish to explain is the two columns at the right side of the form headed "Paid", one column headed "Date" and the other "Check No." If desired, this purchase journal may be used as a Voucher Register, thereby eliminating the necessity of an Accounts Payable Ledger. All invoices, as entered, are given a number and unpaid invoices should be kept together. As payments are made and entered in Cash Journal, the Invoice number is shown along with the amount, and in posting, instead of posting to the usual Accounts Payable Ledger account, the bookkeeper will turn to the Purchase Journal and on the line where that particular invoice number is registered, will check the amount of the invoice as there shown, then insert in "Paid" columns the date and check number. Items without data in "Paid" columns will then represent unpaid accounts, and should, each month, be reconciled with the balance appearing in Accounts Payable account in the ledger.

#### General Journal

This journal, as its name implies, is for purposes other than Sales, Purchases, or Cash. Its principal use will be to enter cost data at the close of job tickets. It is designed to conveniently permit charging costs of sales in the several divisions, with credits to Work In Progress. Another use will be to charge Work In Progress and credit Direct Labor and Materials, Appliances, etc., with labor and materials put into process. Then, too, there are the usual monthly entries covering depreciation, insurance, taxes, interest, etc., which will be entered through the "General" columns, and posted separately to their proper accounts. Of course, the column totals for the month will be posted for all specific columns, such as "Work In Progress," "Cost of Sales—Labor," etc.

#### Cash Journal

This journal is designed to serve both as a Cash Receipts and a Cash Disbursements journal. The

Receipts section is sufficiently designated, and while we have provided specific columns for the more frequent disbursements, we have two blank columns which are available for special purposes as they arise and, in addition, we have provided under "General," debit and credit columns in which to properly enter transactions, either receipts or disbursements, for which there is no specific column.

These several journals are keyed with a letter in front of space provided for page number. By the use of these key letters your ledger entry may promptly show from what journal the transaction came. In hunting for trial balance errors, it is much easier to take off the month's postings in the ledger, segregating them according to the journals from which they came. This procedure permits the bookkeeper to locate, first the journal, then the erroneous posting, or lack of posting. If each journal, as taken off the ledger, balances, it is a foregone conclusion that the error is not in posting. It must, then, be an error in footing the accounts, or taking off the balances. The work sheet for taking off postings by journals should be somewhat as follows:

SALES		PURCHASES		GENERAL		CASH	
Debit	Credit	Debit	Credit	Debit	Credit	Debit	Credit

We now feel we have, in this and earlier articles, fully discussed the plan of accounts which will be found best suited to the typical shop of our readers.

We have here illustrated the several journals, which may be purchased from the Illinois Office Supply Company, Ottawa, who has kindly agreed to carry these forms in stock, thus permitting our readers to acquire these ruled forms at a saving over the cost of such forms made up in small quantities.

Again, permit us to remind our readers that we shall be pleased to have them submit their problems in accounting. Of course, it may be that you have a local accountant serving you, and in that case, we suggest that you discuss this series of articles with him. If your records are not as complete as you would like them and you desire to bring them up to date, you can, by adopting a plan used by many of your fellows, readily compare your operating results with those of others using the same plan of accounts. This is well worth considering.



# Composing Room Ventilating System

By G. R. Stearns

**T**HE composing room in a newspaper plant offers problems in ventilation that sometimes are difficult to overcome because of the excessive heat given off from the lead melting pots on the linotype machines, the gases arising from these machines as the lead is melted, and, where gas-fired machines are used, the consumption of oxygen in the room. To operate a linotype machine it is necessary to heat the supply of lead to a temperature of approximately 550 degrees Fahrenheit, hence a battery of linotypes in a single room will throw-off a volume of heat sufficient to make working conditions both unhealthy and unpleasant, and consequently detract from the efficiency of the workers.

An interesting ventilating problem recently was met successfully in the composing room of the Chicago Journal of Commerce by the Western Ventilating and Engineering Company of Chicago, together with Engineer Samuel R. Lewis and Architect Frank D. Chase. The building is a rather old one and was not originally designed for a newspaper plant. It is four stories high with an English basement, the composing room being on the second floor. The first, third and fourth floors are devoted to editorial rooms and offices, with the press room, the stereotype room and the furnace for melting scrap lead and casting it into pigs located in the basement.

In the spring of 1936 the building was remodeled, the work including the installation of a ventilating system designed to provide six changes of tempered air per hour, or a change of air every ten minutes.

The drawing on the next page shows the plan of the new exhaust system, location of intakes and apparatus and an elevation showing layout at floor girders. A detail shows the fan arrangement.

The air supply is heated to a temperature of between 70 degrees and 80 degrees. This system serves the entire building, with the exception of the basement and the toilet rooms on each of the four upper floors. There is also an exhaust system designed to exhaust approximately 75 per cent of the air supplied to the building. This is accomplished by means of exhaust fans of the propeller type located along the west wall of each floor. These

fans are of two different sizes, 12-inch and 16-inch. The 12-inch fans have a capacity of 1,000 cfm, while the 16-inch fans have a rating of 1,600 cfm, free air delivery.

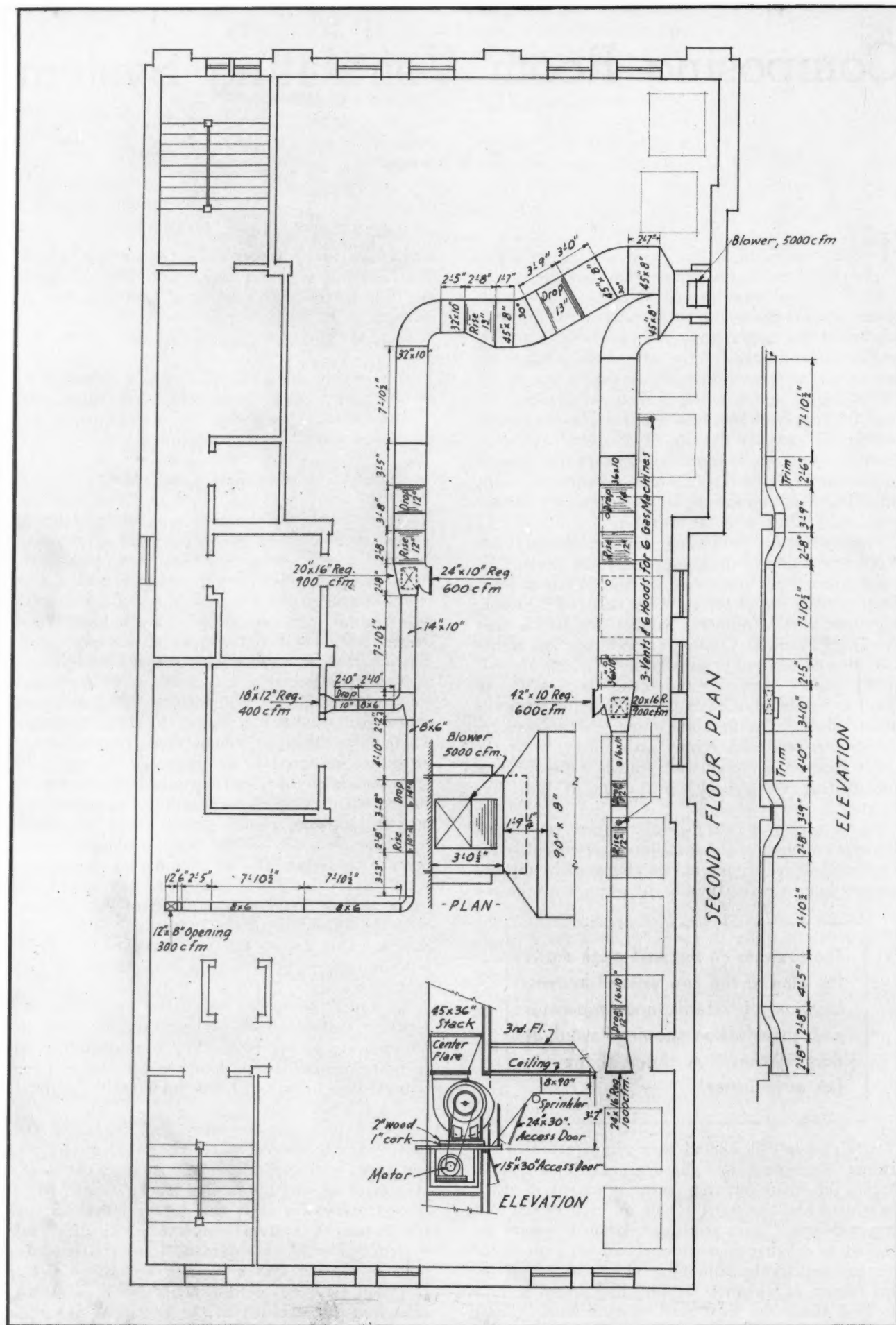
There are two of these propeller fans on the first, second and fourth floors, and three on the third floor where the main editorial room is located. This room is a busy place, rather congested, with a great deal of smoking being done by the occupants, and as a result needs good ventilation.

## Air Supply System

The air intake for the main ventilating system is located above the roof line of the building, the large ventilating unit being enclosed in a soundproof room on the fourth floor. From the intake, the air is drawn through a dry type, throw-away filtering unit located in the soundproof room, there being fifteen sections of 20x20-inch throw-away filters. The air then passes through a copper fin-type heating coil, consisting of four sections of 24x60-inch coils installed in vertical position, the coils being set two wide and two deep, one in back of the other. There is an electrical temperature control system in connection with the heating coils. As an economy measure, the electric controls were not installed when the main ventilating system was put in, but following a trial period it was discovered that they were needed in order to make the system operate properly. The air then passes through the main supply fan, also located in the soundproof room, and is distributed throughout the building, with the exception of the basement and the toilet rooms. This supply fan has a capacity of 11,535 cfm, and is equipped with a 3-hp. motor of 1,200 rpm.

All toilet rooms are ventilated by means of a separate system which exhausts the air only, the outlet being at the roof. The equipment for this is located on the fourth floor and consists of a centrifugal type blower of 1,500 cfm capacity, equipped with a ½ hp. motor.

Special provision has also been made for ventilating the basement, where the problem of fumes and gases arising from the lead furnace, the stereotype machine, and the casting machine was particularly troublesome. It was not desirable to have the basement system connected with the main system. The basement installation consists of a process exhaust system with a separate outlet to the roof. A high-speed exhaust fan of 1,000 cfm capacity was installed in the basement to handle



the ventilating. A galvanized hood, which connects with the exhaust system, has been placed over the casting machine to carry off the gases and fumes from this apparatus. There is a unit heater in the basement for the supply.

The main system and the special systems for the basement and the toilet rooms operated satisfactorily following installation, after a few adjustments such as installation of the electric controls on the main system, but there were many complaints from workers in the composing room regarding the disagreeable condition of the air.

#### Composing Room Conditions

The composing room at the Journal of Commerce is a difficult type of room to ventilate properly, for it was not designed originally for industrial use. The ceiling is low, the room is long and narrow, there are no windows along the east wall, and only two or three windows along the west wall. The north and south exposures, where there are ample windows, must be depended upon mainly for any natural ventilation.

The room contains twenty-five linotype machines, each equipped with a lead melting pot where the lead is heated to a temperature of about 550 degrees Fahrenheit, a Ludlow machine, which also has a metal pot, and a gas-fired machine for "rolling" newspaper mats. Six of the linotypes are heated by gas, the gas flames consuming a large amount of oxygen. It was not uncommon for the temperature in the composing room to mount as high as 110 degrees during the summer, and in the winter 95 degrees was frequently encountered. The layout of the room made it difficult to improve conditions by opening windows, and in the winter to do so made it too cold for those near the open windows to continue work.

#### The Exhaust System

The problem was placed with the architect, the engineer and the contracting firm for solution, and it was decided that a separate exhaust system should be installed to serve the composing room alone which would augment the ventilation provided by the main system. After considering the problem from all angles, it was decided that the most feasible way of overcoming the existing difficulty would be to make the exhaust system predominate over the supply in this particular room. Originally, when the composing room was served only by the main ventilating system, the supply predominated the same as in the rest of the building, only about 75 per cent of the air being exhausted. The result was that not all of the foul air was exhausted.

The duct work of the newly installed exhaust system in the composing room consists of two lines, one on each side of the room. Galvanized iron of 22-gauge and 24-gauge was used for the ducts. The sizes of the ducts vary, of course, as the lines progress. At the extreme ends of the lines, farthest away from the outlet, ducts are 16 inches wide by

10 inches deep, increasing to 36 inches by 10 inches, and increasing further to 45 inches by 8 inches.

There are seven inlet points along these two duct lines, the seven inlets having a total capacity of 4,700 cfm. The capacity of each of these inlets is as follows: 1,000 cfm, 300 cfm, 400 cfm, two inlets of 600 cfm, and two of 900 cfm.

Existing ceiling beams, sprinkler system pipes and electric conduits presented difficulties that had to be met in designing the duct system. The beams and pipes made it necessary to raise and drop the lines frequently. In some cases the ducts were run above the pipes and at other times they were run below the pipes.

#### Air Capacity Data

The room contains approximately 50,000 cubic feet, and the newly installed exhaust system, as previously mentioned, expels approximately 4,700 cfm. Theoretically, an additional 3,200 cfm is expelled by the two propeller fans which are a part of the main ventilating system, or a total exhaust of 7,900 cfm. Actually, however, this volume of air is not exhausted, due to the fact that the propeller fans do not operate at capacity under the new arrangement. The air supply to the composing room totals 4,600 cfm, without taking into consideration the natural leakage into the room from stairways, windows, etc. The system for this room has been designed so that the exhaust will predominate over the supply by approximately 25 per cent.

An interesting feature of the installation is the manner in which the large exhaust fan and motor have been placed in the air chute which leads to the roof. The dimensions of the air chute are 45x26 inches. The fan is of 5,000 cfm capacity, of the double width, double inlet type. The motor, of 2 hp capacity, 1,750 rpm, is mounted on a platform below the fan. In mounting the fan, a one-inch layer of cork insulation was used to prevent vibration noises. The accompanying drawing shows the details of this feature of the job.

Measurements for the metal work were taken off the architect's drawings by Western Ventilating and Engineering Company, and later verified in the building.

All of the metal work was fabricated in the Western Ventilating and Engineering Company's shop because of the better working conditions there. This method was followed both in the installation of the main system and for the special composing room job. It would have been next to impossible to do the fabricating on the job in this particular case due to the extremely crowded working conditions. It is the usual practice of the Western Ventilating and Engineering Company to fabricate in its own shop, the only exception being large installations where there is ample space to do the fabricating on the job.

In assembling the job, the pieces were made up in 6-foot and 8-foot lengths as most convenient for the erection process. Angles and slips were used for the connections.



# Leading the Parade OF POPULAR Whitney-JENSEN Metal Working Tools.. ...the NEW

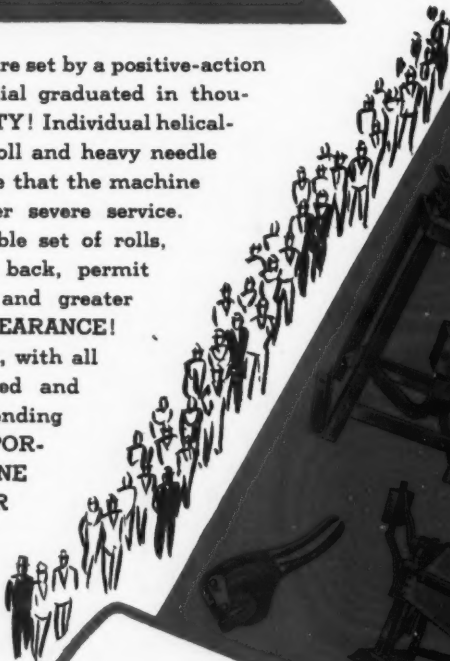
A comprehensive display of Whitney-Jensen Tools, including all new items, will be found at the Heating and Ventilating Exposition, Jan. 24 to 28, Spaces 479 and 480. Come and see it!

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# AMERICAN ARTISAN

January, 1938

## SHOW SECTION



At the Grand Central Palace

At the Roosevelt  
Annual Meeting of the  
National Warm Air Heating and  
Air Conditioning Association

At the Biltmore  
Annual Meeting of the  
American Society of  
Heating and Ventilating Engineers

At the Roosevelt  
Annual Meeting of the  
American Society of  
Refrigerating Engineers

### New York—January 24—28

Industry Takes Over New York .....	Page 66
Program of National Warm Air Heating and Air Conditioning Association .....	Page 68
List of Exposition Exhibitors .....	Page 69
Floor Plans of Exhibit Space .....	Page 70



## The Industry Takes Over New York

January 24-28

**T**HE heating, air conditioning and refrigeration industries are holding their annual meetings and biennial exposition in New York the last week of January.

At the Grand Central Palace some 300 manufacturers are displaying their products in the 5th International Heating, Ventilating and Air Conditioning Exposition. On other pages of this section will be found floor plans of the exhibit spaces and a complete list of exhibitors with their booth numbers.

At the Roosevelt Hotel the National Warm Air

Heating and Air Conditioning Association holds its 41st convention and celebration of the 20th anniversary of its research activities. A glance at the program of this meeting on a following page shows that the arrangements committee has assembled notable speakers and selected highly important subjects for presentation and discussion.

During the same week the American Society of Heating and Ventilating Engineers and the American Society of Refrigerating Engineers are meeting in annual sessions, the heating and venti-



## THE WEEK AT A GLANCE

### EVENTS:

5th International Heating, Ventilating and Air Conditioning Exposition.

41st Convention, National Warm Air Heating and Air Conditioning Association.

44th Annual Meeting, American Society of Heating and Ventilating Engineers.

33rd Annual Meeting, American Society of Refrigerating Engineers.

### PLACE:

New York City.

Exposition—Grand Central Palace.

N.W.A.H.A.C. Assn.—Roosevelt Hotel.

A.S.H.V.E.—Hotel Biltmore.

A.S.R.E.—Roosevelt Hotel.

### TIME:

Exposition—Opens 2:00 p. m., Monday, January 24, and 12 Noon other days. Closes 10:30 p. m. each evening. January 24-28.

N.W.A.H.A.C. Assn. — Committee and board meetings Monday, January 24. Technical and business sessions Tuesday and Wednesday, January 25 and 26. Joint session with A.S.H.V.E. Tuesday, 2:00 p. m.

A.S.H.V.E. — Registration, committee meetings Monday, January 24, 9:30 a. m. Technical Sessions: Tuesday, Wednesday, Thursday and Friday, January 25, 26, 27 and 28. Joint session A.S.H.V.E.-N.W.A.H.A.C. Assn. Tuesday, 2:00 p. m. Joint session A.S.H.V.E.-A.S.R.E., Wednesday, 2:00 p. m.

A.S.R.E.—Technical sessions, Tuesday, Wednesday and Thursday, January 25, 26 and 27. Joint meeting with A.S.H.V.E. Wednesday, 2:00 p. m.

lating group at the Biltmore and the refrigeration group at the Roosevelt. There will be a joint session between the National Warm Air Heating and Air Conditioning Association and the American Society of Heating and Ventilating Engineers on Tuesday afternoon, January 25, at the Biltmore. Also, the two groups join together for their entertainment, as shown on the program.

The Exposition is going to be the biggest thing of its kind held in its history. Manufacturers of products of interest to AMERICAN ARTISAN readers will dominate the three floors of displays and the visitor will find many new developments and ideas to guide him in the coming year.

On show will be the latest in air conditioning units and furnaces, air filters, air washers, bearings, belts and transmission drives, blower-filter

units, cooling and heating coils, refrigerating compressors, controls, fans and blowers, coal, gas and oil-fired furnaces, humidifiers, indicating, recording and testing instruments, insulation, motors, oil burners, pumps, registers and grilles, sheet metal tools and machinery, sheets, stokers, etc. Hundreds of representatives of the different manufacturers will be on hand to explain and answer questions. Many of the exhibits will be operating.

It is evident from this brief summary that the opportunity for worth-while contacts and for absorbing valuable information could not easily be paralleled in any other way. It is a big week that should well repay the time spent in doing it in a big way. An unusually large attendance is assured from all advance signs.

# PROGRAM

## 41st Convention and Celebration of 20th Anniversary of Research Activities of NATIONAL WARM AIR HEATING AND AIR CONDITIONING ASSN.

January 24, 25, 26, 1938

Roosevelt Hotel

New York, N. Y.

### MONDAY, JANUARY 24

See Hotel Bulletin for Meeting Rooms

Board of Directors..... 9:30 A. M.  
Installation Codes Committee.....10:00 A. M.  
Research Advisory Committee.....10:00 A. M.  
Technical Educational Committee..... 1:30 P. M.

### TUESDAY MORNING, JANUARY 25

Grand Ballroom—Roosevelt Hotel

Chairman, President W. L. Rybolt

8:30 a. m.—Registration

Please register. No charge.

9:30 a. m.—Call to Order and Announcements

Our President's Message

10:00 a. m.—Address

Arthur Cutts Willard, President University  
of Illinois

10:30 a. m.—“What's Ahead in Residence Building?”

Thomas S. Holden, F. W. Dodge Corp.,  
New York, N. Y.

The Honorable Mayor of New York, F. H.  
LaGuardia

“The Legislative straight-Jacket on Business”

Honorable Emanuel D. Celler, New York  
N. Y.

“The Value of Cooperation Between the  
Architect and Our Industry”

C. A. Kissinger, Youngstown, O.

12:30 p. m.—RECESS

### TUESDAY AFTERNOON, JANUARY 25

2:00 P. M.

Biltmore Hotel—43d St. at Madison Ave.

Joint Meeting with the American Society of Heating and  
Ventilating Engineers

Chairmen—

D. S. Boyden, President American Society of Heating  
and Ventilating Engineers

W. L. Rybolt, President National Warm Air Heating  
and Air Conditioning Association

Address

F. G. Sedgwick, Chairman of our Research  
Advisory Committee

“Fundamentals Developed from Twenty Years  
of Research”

Prof. A. P. Kratz, University of Illinois

“Air Distribution from Side Wall Outlets”

D. W. Nelson and D. J. Stewart

“Condensation Within Walls”

Prof. F. B. Rowley, A. B. Algren and C. E.  
Lund

4:30 p. m. ADJOURNMENT

### TUESDAY EVENING, JANUARY 25

10:00 p. m.—Night club party, International Casino, Times  
Square. Jointly with A.S.H.V.E. and A.S.R.E.

### WEDNESDAY MORNING, JANUARY 26

Grand Ball Room—Roosevelt Hotel

Chairman—Vice President C. A. Olsen

9:30 a. m.—Research Session

Report and Observations

F. G. Sedgwick, Research Committee  
Chairman, Minneapolis, Minn.

Latest from our investigation of summer  
cooling

The Trend in Furnace Sizes

Heat Losses and Temperature Drops in  
Forced Air Ducts

Prof. S. Konzo and R. B. Engdahl, Re-  
search Assistant

### WEDNESDAY AFTERNOON

Chairman—President W. L. Rybolt

1:30 p. m.—Our Installation Codes

Prof. J. D. Hoffman

2:30 p. m.—“Recent Developments in the Filtration of Air”

H. E. Birkholz, Louisville, Ky.

3:00 p. m.—“Meeting Outside Competition or Comparative  
Values”

Frank E. Mehrings, Peoria, Ill.

3:30 p. m.—Election of Officers

Final Adjournment

# List of Exposition Exhibitors

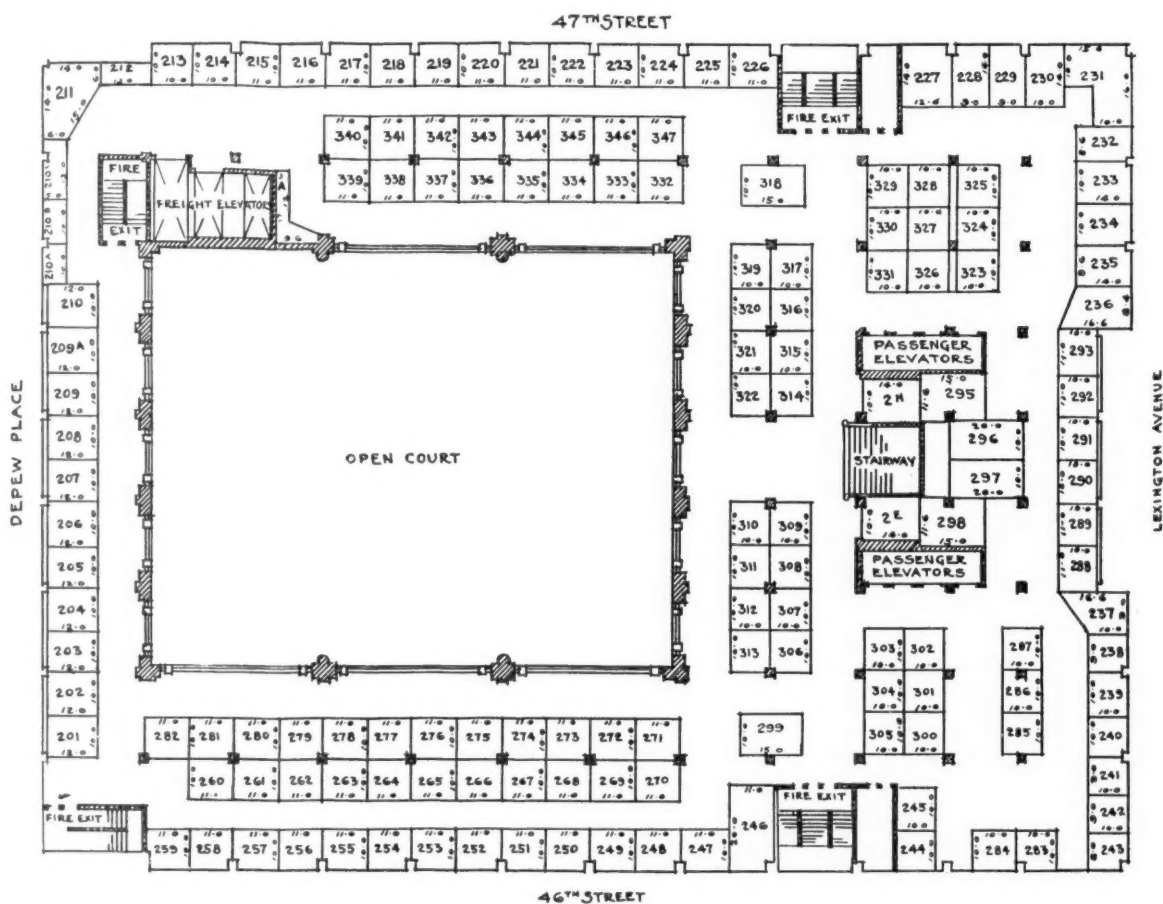
Name of Exhibitor	Address	Booth No.	Name of Exhibitor	Address	Booth No.
Adams Engineering Co.	Chicago, Ill.	550-551	Bryant Heater Co.	Cleveland, O.	66-67
Advance Engineering Co.	New York, N. Y.	288-289	Buffalo Forge Co.	Buffalo, N. Y.	26-27
Aerofin Corp.	Syracuse, N. Y.	230	Burnham Boiler Corp.	Irvington, N. Y.	233-234
Air Conditioning Blue Book	Chicago, Ill.	11	Carbondale Division, Worth-		
Air Conditioning combined with Oil Heat	New York, N. Y.	83-84	ington Pump & Machinery Corp.	Harrison, N. J.	413-414
Air Conditioning Distributors Co.	New York, N. Y.	454	Carey Co., Philip	Cincinnati, O.	411-412
Air Conditioning Trends	Chicago, Ill.	42	Carnegie-Illinois Steel Corp.	Pittsburgh, Pa.	52-53
Air Controls, Inc., Div. of Cleveland Heater Co.	Cleveland, O.	316-317	Carrier Corp.	Syracuse, N. Y.	227-228-229
Air Devices Corp. (Thermal Units Mfg. Co.)	Meriden, Conn.	535	Carter Coal Co., Inc.	New York, N. Y.	202
Air-Maze Corp.	Cleveland, O.	528	Cashin Co., W. D.	So. Boston, Mass.	332-333
Airtemp, Inc., A Subsidiary of Chrysler Corp.	Dayton, O.	70	Celotex Corp.	Chicago, Ill.	514
Airtherm Manufacturing Co.	St. Louis, Mo.	344-345	Century Electric Co.	St. Louis, Mo.	314-315
Alco Valve Co., Inc.	St. Louis, Mo.	248-249	Century Engineering Corp.	Cedar Rapids, Ia.	268-269-270
Aldrich Co.	Peoria, Ill.	463-464	Chace Co., W. M.	Detroit, Mich.	222
Allis-Chalmers Mfg. Co.	Milwaukee, Wis.	203-204-205	Chicago Pump Co.	Chicago, Ill.	78
Alpha Steam Specialty Co.	New York, N. Y.	528	Cole-Sullivan Engineering Co.	Minneapolis, Minn.	540
American Air Filter Co., Inc.	Louisville, Ky.	451-452-453	Columbia Steel Co.	San Francisco, Cal.	52-53
American Artisan	Chicago, Ill.	42	Condensation Engineering Corp.	Chicago, Ill.	443-444
American Blower Corp.	Detroit, Mich.	3	Consumers Petroleum Corp.	New York, N. Y.	536
American Brass Co.	Waterbury, Conn.	65	Cook Electric Co.	Chicago, Ill.	237-245
American Gas Products Corp.	New York, N. Y.	5	Cork Import Corp.	New York, N. Y.	337
American Machine & Metals, Inc., De Bothezat Ventilating Equipment Div.	New York, N. Y.	215	Crane Co.	Chicago, Ill.	54-55
American Metal Hose Branch, American Brass Co.	Waterbury, Conn.	65	Crowe Name Plate & Mfg. Co.	Chicago, Ill.	273
American Oil Burners & Heating Utilities	Brooklyn, N. Y.	214	Cruickshank Co.	Sunbury, Pa.	237-245
American Radiator Co.	New York, N. Y.	2 to 6	Curtis Refrigerating Ma- chine Co.	St. Louis, Mo.	495
American Rolling Mill Co.	Middletown, O.	69	Cyclone Fence Co.	Waukegan, Ill.	52-53
American Society of Heating & Ventilating Engineers	New York, N. Y. A-Main Floor		Davidson Fan Co.	Newton, Mass.	515
American Society of Refrig- erating Engineers	New York, N. Y. A-Main Floor		Davies Air Filter Corp.	New York, N. Y.	539
American Steel and Wire Co.	Chicago, Ill.	52-53	Dayton Rogers Mfg. Co.	Minneapolis, Minn.	474
Anchor Post Fence Co.	Baltimore, Md.	508-509-510	Dayton Rubber Mfg. Co.	Dayton, O.	334-335
Anderson Products, Inc.	Cambridge, Mass.	235	DeBothezat Ventilating Equipment Div., American Machine and Metals, Inc.	New York, N. Y.	215
Anemostat Corp. of America	New York, N. Y.	2N and 295	Deegan Regulator Co.	New York, N. Y.	237-245
Anthracite Industries, Inc.	New York, N. Y.	237 to 245, 283 to 287, 300 to 305	Delco-Frigidaire Condition- ing Corp.	Dayton, O.	72-73
Apex Electric Mfg. Co.	Cleveland, O.	454	Detroit Lubricator Co.	Detroit, Mich.	2
Armstrong Cork Products Co.	Lancaster, Pa.	274	Dole Valve Co.	Chicago, Ill.	206
Armstrong Machine Works	Three Rivers, Mich.	288-289	Domestic Engineering	Chicago, Ill.	11
Auburn Automobile Co., Air Conditioning Div.	Chicago, Ill.	476	Dooley, Walter F.	Boston, Mass.	402-403
Auer Register Co.	Cleveland, O.	505	Dreis & Krump Mfg. Co.	Chicago, Ill.	436
Auto-Heat Corp.	New York, N. Y.	543-544	Dresser Mfg. Co., S. R.	Bradford, Pa.	477
Automatic Burner Corp.	Chicago, Ill.	21	Dunham Co., C. A.	Chicago, Ill.	46-47
Automatic Heat & Air Con- ditioning	Chicago, Ill.	11	Duo-Therm Division, Motor Wheel Corp.	Lansing, Mich.	561-562
Automatic Products Co.	Milwaukee, Wis.	261-262	Dupont Fuel Oil Burner Co., Inc.	Brooklyn, N. Y.	497
Automatic Temperature Con- trol, Inc.	New York, N. Y.	560	Eagle-Picher Sales Co.	Cincinnati, O.	485-486
Autovent Fan and Blower Co.	Chicago, Ill.	34	Economy Pumping Machin- ery Co.	New York, N. Y.	58-59
Babcock & Wilcox Co., Re- fractories Div.	New York, N. Y.	533-534	Electric Air Heater Co., Div., American Foundry Equip- ment Co.	Mishawaka, Ind.	441
Baker Ice Machine Co., Inc.	Omaha, Neb.	45	Electric Furnace Man, Inc.	New York, N. Y.	237-245
Baldor Electric Co.	St. Louis, Mo.	224	Electrol, Inc.	Clifton, N. J.	554-555-556-557
Baldwin-Hill Co.	Trenton, N. J.	442	Electronic Control Corp.	Chicago, Ill.	402
Balloffet Dies and Nozzle Co., Inc.	Guttenberg, N. J.	525	Emerson Electric Mfg. Co.	St. Louis, Mo.	340-341
Barber-Colman Co.	Rockford, Ill.	323-324-325	Evans Corp., George	Moline, Ill.	565-566
Barnes & Jones, Inc.	Boston, Mass.	312-313	Fairbanks, Morse & Co.	Chicago, Ill.	89-90
Beaton and Cadwell Mfg. Co.	New Britain, Conn.	422	Fairfield Oil Heating Co., Inc.	Greenwich, Conn.	432
Beaver Pipe Tools, Inc.	Warren, O.	28-E	Fedders Manufacturing Co.	Buffalo, N. Y.	346-347
Bell & Gossett Co.	Chicago, Ill.	28-W	Field Manufacturing Co.	Chicago, Ill.	415
Bethlehem Steel Co.	Bethlehem, Pa.	71	Fitzgibbons Boiler Co., Inc.	New York, N. Y.	64
Blinks Mfg. Co.	Chicago, Ill.	490-491-492	Fluid Heat Div., Anchor Post Fence Co.	Baltimore, Md.	508-509-510
Black & Decker Mfg. Co.	Towson, Md.	462	Fox Furnace Co.	Elyria, O.	5-6
Boiler Room Equipment, Inc.	New York, N. Y.	415	Frick Co.	Waynesboro, Pa.	74
Breuer Electric Mfg. Co.	Chicago, Ill.	282	Friez & Sons, Inc., Julien P.	Baltimore, Md.	49
Brown Instrument Co., Div. of Minneapolis-Honeywell Regulator Co.	Philadelphia, Pa.	19-20	Fuel Oil Journal	New York, N. Y.	292-293
			Fulton Sylphon Co.	New York, N. Y.	252-253
			Furblo Co.	Hermansville, Mich.	408



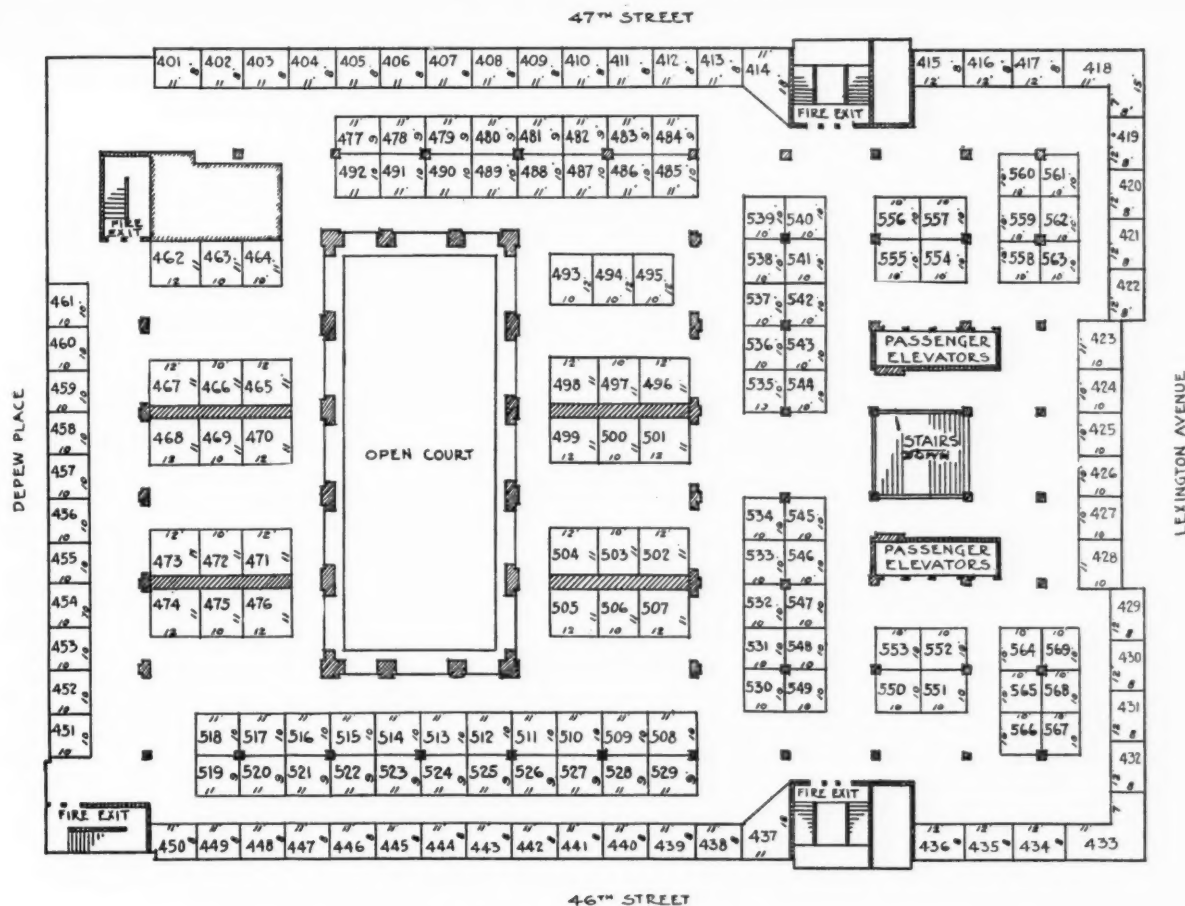
## FLOOR PLANS OF EXHIBIT SPACE



Main Floor Plan of Exhibit Space



Mezzanine Floor Plan of Exhibit Space



Third Floor Plan of Exhibit Space

## Exhibitors [Continued]

### Name of Exhibitor      Address      Booth No.

General Controls Co.	San Francisco, Cal.	507
General Electric Co., Air Conditioning Dept.	Bloomfield, N. J.	7
General Electric Co.	Schenectady, N. Y.	24
General Fittings Co.	Providence, R. I.	409-410
General Oil Heating Corp.	West New York, N. J.	455
General Refrigeration Corp.	Rockford, Ill.	221
Genesee Electric Products Co.	Rochester, N. Y.	530
Gilbert & Barker Mfg. Co.	Springfield, Mass.	545 to 549
Gilbert & Son, Inc., Harry E.	Bridgeport, Conn.	259
Grinnell Co., Inc.	Providence, R. I.	332-333
Grob Brothers	Grafton, Wis.	470

Harris & Co., Arthur	Chicago, Ill.	489
Harsch Co., Inc., H.	Maplewood, N. J.	496
Hart & Cooley Manufacturing Co.	Holland, Mich.	22
Heating & Ventilating	New York, N. Y.	277
Heating Journals, Inc.	New York, N. Y.	83-84
Heating, Piping and Air Conditioning	Chicago, Ill.	42
Heil Co.	Milwaukee, Wis.	23
Henry Furnace & Foundry Co.	Cleveland, O.	210A-210B-210C
Henry Valve Co.	Chicago, Ill.	431
Hershey Machine & Foundry Co.	Manheim, Pa.	237-245
Hinrichsen, Inc., A. F.	New York, N. Y.	515
Hoffman Specialty Co.	New York, N. Y.	58-59
Hotstream Heater Co.	Cleveland, O.	216

Ilg Electric Ventilating Co.	Chicago, Ill.	68
Illinois Engineering Co.	Chicago, Ill.	81-82
Illinois Testing Laboratories, Inc.	Chicago, Ill.	38

### Name of Exhibitor      Address      Booth No.

Imperial Brass Mfg. Co.	Chicago, Ill.	264
Independent Air Filter Co.	Chicago, Ill.	487-488
Independent Register Co.	Cleveland, O.	319-320
Industrial Press	New York, N. Y.	277
Ingersoll-Rand Co.	New York, N. Y.	512-513
Insto-Gas Corp.	Detroit, Mich.	529

James Regulator Co.	Pottsville, Pa.	237-245
Janette Mfg. Co.	Chicago, Ill.	475
Jenkins Bros.	New York, N. Y.	13
Johns-Manville	New York, N. Y.	87-88
Johnson Co., S. T.	Philadelphia, Pa.	256-257-258
Johnson Service Co.	Milwaukee, Wis.	75
Joliet Heating Corp.	Joliet, Ill.	499-500-501
Jones & Laughlin Steel Corp.	Pittsburgh, Pa.	48

Kaustine Co., Inc.	Perry, N. Y.	469
Keeney Publishing Co.	Chicago, Ill.	42
Kelvinator Div. of Nash-Kelvinator Corp.	Detroit, Mich.	326 to 331
Kent Co., Inc.	Rome, N. Y.	467
Kewanee Boiler Corp.	Kewanee, Ill.	3
Kleen-Heet, Inc.	Chicago, Ill.	21
Kol-Ax Co., Inc.	Stroudsburg, Pa.	237-245
Korth Oil Burner Corp.	Roselle Park, N. J.	526-527

Koven & Bros., L. O.	Jersey City, N. J.	211
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Lamneck Products, Inc.	Columbus, O.	260
Lau Blower Co.	Dayton, O.	265-266
Lochinvar Corp.	Detroit, Mich.	502-503-504
Lycoming Mfg. Co., Spencer Heater Div.	Williamsport, Pa.	318
Lynn Products Co.	Lynn, Mass.	433

# Exhibitors [Continued]

Name of Exhibitor	Address	Booth No.	Name of Exhibitor	Address	Booth No.
Maas & Waldstein Co.	Newark, N. J.	434	Sheet Metal Worker	New York, N. Y.	299
Macrae, Inc.	Brooklyn, N. Y.	471	Silent Glow Oil Burner Corp.	Hartford, Conn.	231-232
Malleable Iron Fittings Co.	Branford, Conn.	35	Simplex Oil Heating Corp.	New York, N. Y.	419-420
Marsh Corp., Jas. P.	Chicago, Ill.	94	Spencer Heater Div., Lycom- ing Mfg. Co.	Williamsport, Pa.	318
Marsh Tritrol Co.	Chicago, Ill.	94	Spencer Thermostat Co.	Attleboro, Mass.	37
Maurey Mfg. Corp.	Chicago, Ill.	406	Spoecher-Lange Co.	Clayton, Mo.	448
May Oil Burner Corp.	Baltimore, Md.	8	Standard Lime & Stone Co.	Baltimore, Md.	563
McDonnell & Miller	Chicago, Ill.	41	Standard Products Co., Steechan Blind Div.	Cleveland, O.	465
Mercoid Corp.	Chicago, Ill.	85-86	Staynew Filter Corp.	Rochester, N. Y.	449-450
Meyer & Bro. Co., F.	Peoria, Ill.	10	Steel and Tubes, Inc.	Cleveland, O.	208-209
Meyer Furnace Co.	Peoria, Ill.	10	Sterling Engineering Co.	Milwaukee, Wis.	212-213
Michigan Tank & Furnace Corp.	Detroit, Mich.	502-503-504	Stoker & Air Conditioner Journal	New York, N. Y.	291
Micro-Westco Inc.	Bettendorf, Ia.	423 to 428	Streamline Pipe and Fittings Div., Mueller Brass Co.	Port Huron, Mich.	14
Milwaukee Valve Co.	Milwaukee, Wis.	403	Sturtevant Co., B. F.	Hyde Park, Boston, Mass.	9
Minneapolis-Honeywell Reg- ulator Co.	Minneapolis, Minn.	19-20	Sundstrand Engineering Co.	Rockford, Ill.	223
Modine Mfg. Co.	Racine, Wis.	93	Sundstrand Machine Tool Co.	Rockford, Ill.	343
Mojonier Bros. Co.	Chicago, Ill.	498	Supreme Electric Products Corp.	Rochester, N. Y.	530
Monarch Mfg. Wks., Inc.	Philadelphia, Pa.	201	Surface Combustion Corp.	Toledo, O.	278 to 281
Montgomery Bros.	San Francisco, Cal.	515	Swirling Heat, Inc.	Arlington, Va.	404
Motor Equipment Co.	Wichita, Kas.	447	Sylphon Control Systems, Inc.	New York, N. Y.	252-253
Motor Wheel Corp., Duo- Therm Div.	Lansing, Mich.	561-562	Taco Heaters, Inc.	New York, N. Y.	44-A
Mueller Brass Co.	Port Huron, Mich.	14	Tennessee Coal, Iron & R. R. Co.	Birmingham, Ala.	52-53
Mueller Furnace Co., L. J.	Milwaukee, Wis.	32-33	Thermal Units Mfg. Div., Air Devices Corp.	Meriden, Conn.	535
Nash Engineering Co.	So. Norwalk, Conn.	87-88	Thrush & Co., H. A.	Peru, Ind.	210
National Radiator Corp.	Johnstown, Pa.	76-77	Timken Silent Automatic Div., Timken-Detroit Axle Co.	Detroit, Mich.	56-57
National Regulator Co., Division, Minneapolis- Honeywell Regulator Co.	Chicago, Ill.	19-20	Titusville Iron Works Co.	Titusville, Pa.	552-553
National Sheet Metal Con- tractor	Chicago, Ill.	298	Toledo Pipe Threading Ma- chine Co.	Toledo, O.	493
National Tube Co.	Pittsburgh, Pa.	52-53	Tork Clock Co., Inc.	Mt. Vernon, N. Y.	267
Nesbitt, Inc., John J.	Holmesburg, Philadelphia, Pa.	15-B	Torrington Mfg. Co.	Torrington, Conn.	207
New York French Range Co.	New York, N. Y.	237-245	Tuthill Pump Co.	Chicago, Ill.	567
Oliver & McClellan, Inc.	New York, N. Y.	441	Tuttle & Bailey, Inc.	New Britain, Conn.	271-272
Owens-Illinois Glass Co.	Toledo, O.	481-482	United States Radiator Corp.	Detroit, Mich.	306-307-308-309
Patterson-Kelley Co., Inc.	New York, N. Y.	2E	United States Register Co.	Battle Creek, Mich.	25
Penn Electric Switch Co.	Goshen, Ind.	310-311	United States Steel Corp.	Pittsburgh, Pa.	52-53
Perfection Stove Co.	Cleveland, O.	15C	Utica Radiator Corp.	Utica, N. Y.	437-438-439-440
Perfex Corp., Controls Div.	Milwaukee, Wis.	12	Viking Air Conditioning Corp.	Cleveland, O.	568
Perfex Corp., Unit Heater Div.	Milwaukee, Wis.	39	Viking Pump Co.	Cedar Falls, Ia.	457
Petroleum Heat and Power Co.	Stamford, Conn.	15-A	Vilter Mfg. Co.	Milwaukee, Wis.	31
Petrometer Corp.	Long Island City, N. Y.	290-415-416	Volcano Burner Corp.	New York, N. Y.	564
Plibrico Jointless Firebrick Co.	Chicago, Ill.	40	Vortex Mfg. Co.	Chicago, Ill.	461
Plumbing & Heating News	Chicago, Ill.	11	Voss Co., J. H. H.	New York, N. Y.	429-430
Plumbing & Heating Trade Journal	New York, N. Y.	263	Wagner Electric Corp.	St. Louis, Mo.	517-518
Preferred Utilities Mfg. Corp.	New York, N. Y.	254-255	Ward Machinery Co.	Chicago, Ill.	435
Propellair Inc.	Springfield, O.	441	Waterfilm Boilers, Inc.	Jersey City, N. J.	211
Randall Graphite Products Corp.	Chicago, Ill.	342	Waterloo Register Co.	Waterloo, Ia.	421
Refractory & Insulation Corp.	New York, N. Y.	559	Waterman-Waterbury Co.	Minneapolis, Minn.	338-339
Refrigeration & Air Condi- tioning Institute, Inc.	Chicago, Ill.	445-446	Watts Regulator Co.	Lawrence, Mass.	236
Refrigeration Appliances, Inc.	Chicago, Ill.	494	Webster & Co., Warren	Camden, N. J.	43-44B
Rega Mfg. Co.	Rochester, N. Y.	407	Webster Electric Co.	Racine, Wis.	18
Reif-Rexoil, Inc.	Buffalo, N. Y.	417-418	Weil-McLain Co.	Chicago, Ill.	321-322
Republic Steel Corp.	Cleveland, O.	60-61	Westinghouse Electric & Mfg. Co.	East Pittsburgh, Pa.	91-92
Reynolds Corp.	New York, N. Y.	516	White Manufacturing Co.	St. Paul, Minn.	209A
Richardson & Boynton Co.	New York, N. Y.	79	Whiting Corp.	Harvey, Ill.	296-297
Richmond Engineering Co., Inc.	Richmond, Va.	528	Whitney Metal Tool Co.	Rockford, Ill.	479-480
Ric-wil Co.	Cleveland, O.	250-251	Williams Oil-O-Matic Heat- ing Corp.	Bloomington, Ill.	225-226
Ridge Tool Co.	Elyria, O.	483-484	Wilson & Co., H. A.	Newark, N. J.	"A" Mez.
Ruberoid Co.	New York, N. Y.	336	Wing Mfg. Co., L. J.	New York, N. Y.	30
Russell & Co., W. A.	New York, N. Y.	511	Wood Industries, Inc., Gar.	Detroit, Mich.	246-247
Sangamo Electric Co.	Springfield, Ill.	506	Worthington Pump & Ma- chinery Corp., Carbondale Div.	Harrison, N. J.	413-414
Sarco Co., Inc.	New York, N. Y.	80	"X" Laboratories, Inc.	New York, N. Y.	558
Schade Valve Mfg. Co.	Philadelphia, Pa.	528	Yarnall-Waring Co.	Philadelphia, Pa.	541-542
Schwitzer-Cummins Co.	Indianapolis, Ind.	237-245	York Ice Machinery Corp.	York, Pa.	50-51
Scott-Newcomb, Inc.	St. Louis, Mo.	531-532	York Oil Burner Co., Inc.	York, Pa.	62-63
Scully Steel Products Co.	Chicago, Ill.	52-53	Young Radiator Co.	Racine, Wis.	275-276
Seaboard Refractories Co.	Perth Amboy, N. J.	259	Young Regulator Co.	Cleveland, O.	569
			Youngstown Sheet & Tube Co.	Youngstown, O.	17



# RESIDENTIAL AIR CONDITIONING SECTION

**I**T is physically impossible to present, within the space limitations of this month's section, a fair cross section of all the ramifications of residential air conditioning.

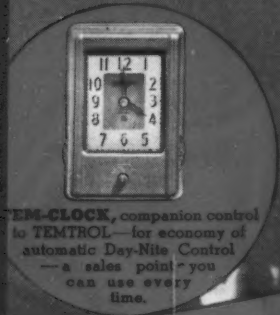
- - - Of this, however, we feel sure—in coming months there will be increasing demand for an engineering procedure which consumes less time. There will be critical need for basic information on humidification, drying, vapor action.

- - - As velocities increase and duct sizes grow smaller, we will have to know resistance of fittings. And with air conditioning invading large commercial structures and new types of houses, examples of proved systems will be helpful.

- - - With summer comfort popularly demanded, the limitations of each system of cooling must be clearly defined.

- - - And so—with these needs in mind—we begin 1938 with information on these subjects in this, the first issue of the new year.

# A GOOD WORD FOR YOU..



TEM-CLOCK, companion control to TEMTROL—for economy of automatic Day-Nite Control—a sales point—you can use every time.

## ...AND PENN Comfort Zone CONTROL

...Means Fewer Service Calls...

she is no longer 1937's prospect, but 1938's satisfied customer...and...a satisfied customer is just like money in the bank. That's why Penn means profit to you. Penn means maximum home enjoyment to your customers. Penn means Comfort Zone Control, most powerful automatic heating sales story that you can tell. Use it. Write for Comfort Zone sales aids—or—consult us on your control problems.



TEMTROL accurately controls temperature from its table height location.

**1938 PROFIT MEMO . . . Standardize on these Penn Controls . . .** 1 Tem-Clock (Electric Day-Nite Timer). 2 Temtrol (Heat Anticipating Thermostat). 3 Saftrols (Safety Combustion Controls). 4 Stoker Relays. 5 Hot Water Limit Switches. 6 Steam Limit Switches. 7 Warm Air Limit Switches. 8 Furnace Fan Controls. 9 Circulator Controls. 10 Unit Heater Controls. 11 Heating and Cooling Thermostats. 12 Humidistats. 13 Gas Valves. 14 Water Valves. 15 Solenoid Valves. 16 General Purpose Relays. 17 Compressor Controls.

## PENN ELECTRIC SWITCH CO.

GOSHEN, INDIANA

OFFICES: New York, Boston, Detroit, Dayton, Chicago, Moline (Ill.). EXPORT: 100 Varick St., N. Y. C. Distributors in Principal Cities. REPRESENTATIVES: Garland-Affolter Engr. Corp., San Francisco, Seattle, Portland, Los Angeles; Forland Pump and Machinery Co., Kansas City; The Uhl Co., Minneapolis; Jules Beneks, St. Louis; Monarch Sales, Denver.

### CLIP OFF THIS COUPON

PENN ELECTRIC SWITCH CO., Goshen, Indiana  
Send me (no charge) \_\_\_\_\_ "Home Comfort Guide"  
moving charts and full instructions for their operation.  
I employ \_\_\_\_\_ salesmen. I handle \_\_\_\_\_  
(Makes of equipment)  
Name \_\_\_\_\_  
Street and No. \_\_\_\_\_  
City \_\_\_\_\_ State \_\_\_\_\_



A Stoker is a hard job to start, especially when a clinker is present, and the motor is liable to overload when the coal travel is obstructed by the sticking and crunching of coal or foreign objects.

Therefore, a stoker motor *must* do 3 things, easily and without strain:

- (1) Start a heavy load from zero speed.
- (2) Accelerate this heavy load up to speed.
- (3) Keep the load running even under ordinar-

ily severe obstructions to the coal passage.

Since the maintenance of normal voltage at the motor is necessary to produce these normal torque characteristics, the use of Century Type RS Single Phase Motors is definitely recommended—because the starting current of these motors is low. This means that they affect the starting voltage less than any other type of Single Phase Motor.

Specify Century Type RS Repulsion Start Induction Motors for those tough stoker jobs.

CENTURY ELECTRIC COMPANY  
1806 Pine Street

St. Louis, Mo.

Offices and Stock Point in Principal Cities

SIZES UP TO 600



HORSE POWER

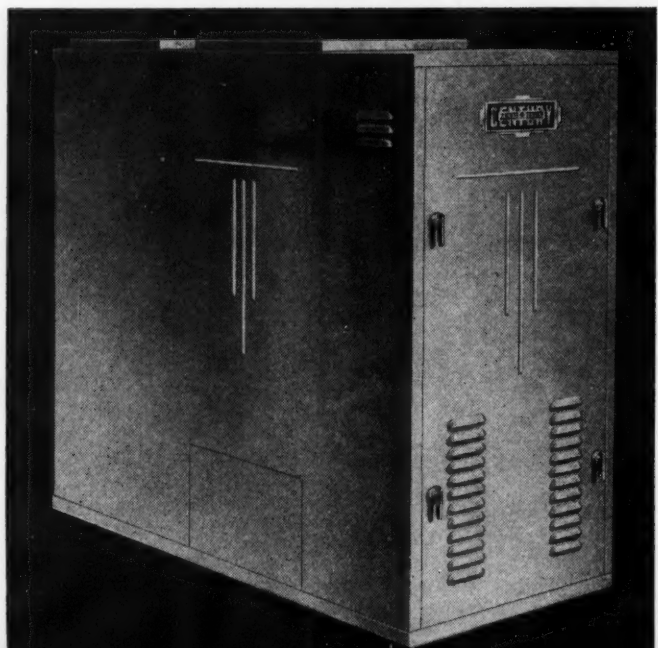




*Booths Nos. 268-269-270*  
5th INTERNATIONAL HEATING  
and VENTILATING EXPOSITION  
January 24-28 • • • New York City

# SEE CENTURY

**F**OLLOW the crowd. Watch the excitement. Learn the big news. See Century first at the International. One of the most complete lines in America. Conversion burners. New boiler-burner units. Warm air conditioning furnace units. Plus a revolutionary new hot water heater. See these many sensational improvements and striking new models. The pace-setters for 1938. A real opportunity for dealers to forge ahead . . . way out in front . . . in sales . . . in profits. If you're not attending, write for complete details of Century for '38. The CENTURY ENGINEERING CORP., Cedar Rapids, Iowa. Veteran Builders of Fine Oil Burning Equipment.

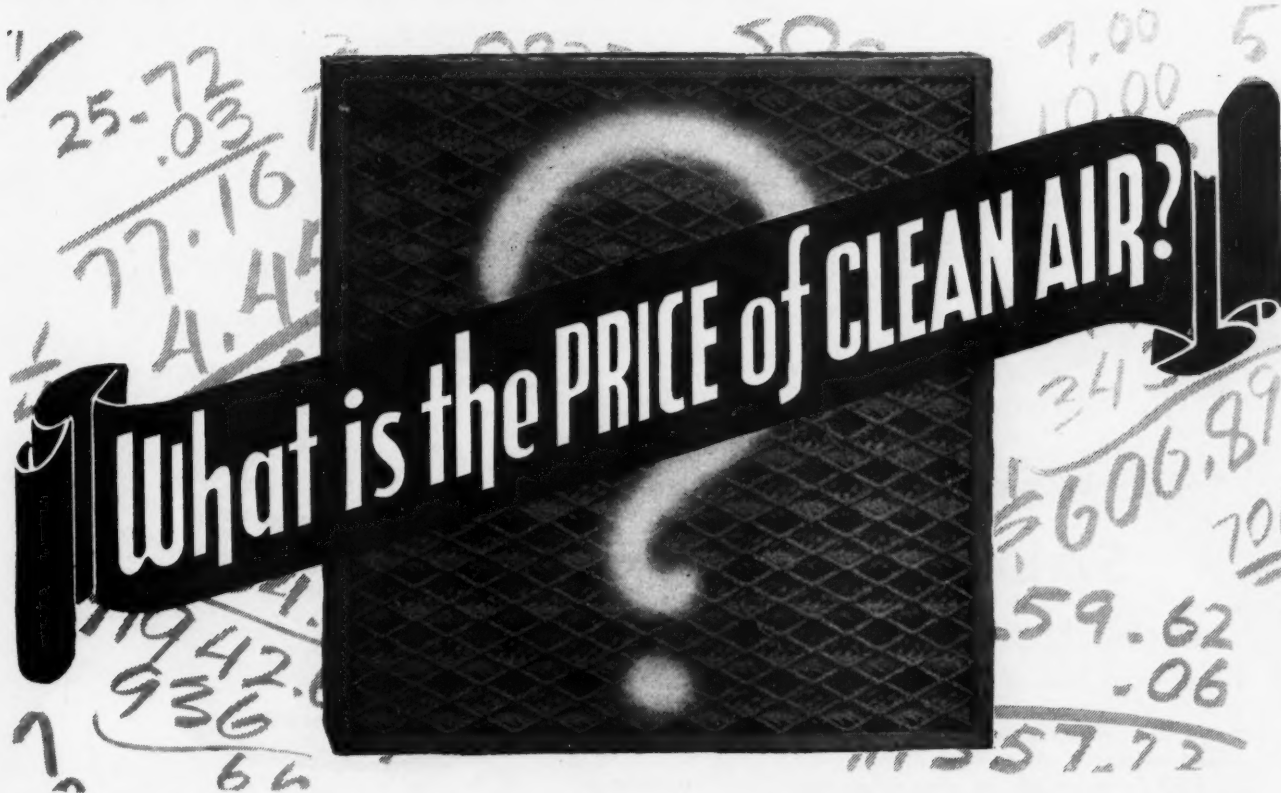


## CENTURY

Conversion Burners      Boiler-Burner Units      Warm Air  
Furnace Units with Air Conditioning      Hot Water Heaters

### CENTURY ZEPH-O-LATOR

A pace-setter in performance and sales. In one attractive unit, it offers Century automatic oil heat and winter air conditioning. See it! Sell it!



THE price of clean air is not merely the cost of an air filter. It is the initial filter investment *plus* the expense of maintenance and upkeep.

Because of this, many buyers have turned to permanent, washable filters because of their low over-all economy.

A fair example of this viewpoint is shown by the larger users of filters among the better chain stores. These companies are noted for their careful buying. It is the basis of their success. They are interested in buying cheaply only insofar as it means getting the most for their money. It should be of interest then to other users of air conditioning when such companies are willing to pay for permanent type filters to be used in their own stores.

S. S. Kresge Company, for instance, has standardized on American permanent washable filters and recently purchased more than 1,000 units. They are also specifying American M/W filters for all of their new air conditioning installations.

S. H. Kress & Company have standardized on American Airmat filter and feel that even at its higher price it is more economical for their service.

Another large chain operator uses automatic air filters in all their large stores. Being shrewd buyers, they know they pay for the best in the end so make sure they get the best at the start.

The Pullman Company was one of the first large users of air conditioning to discover the advantages of permanent type filters. Their original air conditioned cars were changed over to American permanent washable types at the request of the operating department

to eliminate the frequent expense of maintenance. Since then the American permanent filter has become standard equipment for all their mechanically air conditioned cars.

When you stop to consider that at least 50% of the satisfactory performance of an air conditioning system depends upon the efficiency of the filters used, isn't it economically sound to allow as little as 5% of the total cost of the system as "the price of clean air"?

As manufacturers of all types of air filters, we know that clean air at minimum cost does not mean necessarily the cheapest filter that will answer the purpose, but the type that meets the requirements in the most economical manner.

If you are a buyer of air conditioning equipment, insist on the use of better type filters—if you are a manufacturer, make better

type filters available for your own protection as well as for the satisfaction of your customers.

Engineering data is available and will be sent free on request to manufacturers, dealers or users of air conditioning equipment who are interested in the price of clean air.

#### Price of Clean Air = Initial Cost of Filter + Expense of Maintenance

*Granting the higher first cost of permanent filters, their saving in maintenance is a definite and important factor.*

*Permanent filters are simply washed and recoated at a cost of less than 5 cents for Viscosine.*

*On the same capacity basis, filter sheets for the Airmat filter cost approximately 25 cents.*

*Automatic filters are self-cleaning and require only a few cents per month for maintenance.*

## AMERICAN AIR FILTER CO., Inc.

INCORPORATED

113 Central Avenue, LOUISVILLE, KENTUCKY

In Canada: Darling Bros., Ltd., Montreal, P. Q.



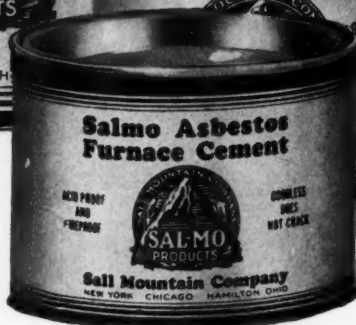
# SALL MOUNTAIN COMPANY

NEW YORK  
70 Pine St.

CHICAGO  
176 W. Adams St.

HAMILTON, OHIO  
P. O. Box 55

L. W. SWIGERT  
Pacific Coast Representative  
SEATTLE, WASH.



## SAL-MO Asbestos Furnace Cement

A high grade Furnace Cement, scientifically made from the best grades of Asbestos Fibre and the finest high temperature refractory clay. SAL-MO has no oils to burn out and no sand to give added weight.

SAL-MO Furnace Cement is easily applied; binds immediately; hardens quickly; will not crack or shrink. It forms a perfect joint with ALL metals, fire-brick and stone. Ideal for repairing broken joints and cracks in castings, resetting old furnaces as well as for new work. Joints are air- and gas-tight and are not affected by heat.

SAL-MO Asbestos Furnace Cement conforms to the Furnace Manufacturer's most rigid specifications.

### Send For FREE Test Sample

Write us about your Furnace Cement requirements. We shall be glad to send you FREE, samples for you to test and compare with any other Furnace Cement made.

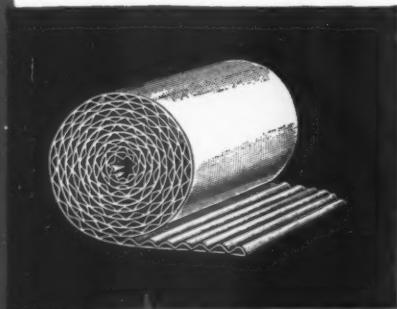
## SAL-MO ASBESTOS PRODUCTS

### For Warm Air Insulation and Air Conditioning

Sall Mountain Company manufactures and offers a complete line of Asbestos Insulation materials for Furnace Manufacturing and installation also Warm Air Heating and Air Conditioning equipment.

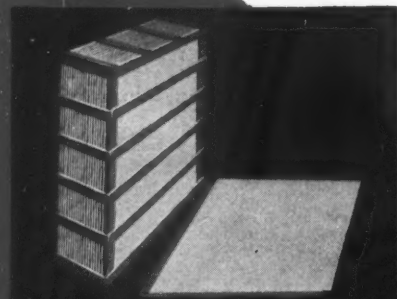
Other well known SAL-MO Asbestos Products include Asbestos Cements, and coverings for all types of High Pressure and Low Pressure Pipe Lines.

Write us regarding your insulation requirements.



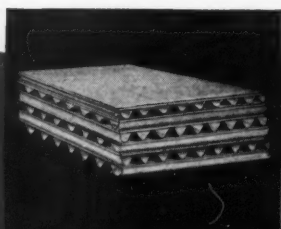
#### AIRCELL CORRUGATED ASBESTOS PAPER

For wrapping warm air pipes and general insulation. Rolls 36 1/2" wide, contain 250 square feet (83 1/3 lineal feet) WEIGHT: about 50 pounds per roll.



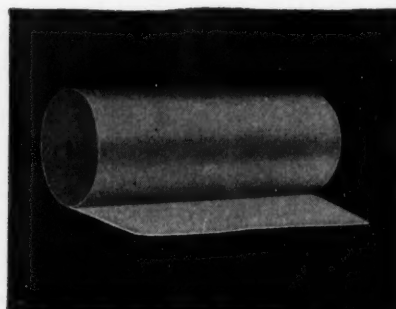
#### ASBESTOS MILLBOARD

Standard size sheets, 42" x 48" in crates. WEIGHTS: about 400 to 450 pounds. Standard thicknesses, 1/16", 3/32", 1/8", 3/16", 3/8", 1/2". Also special sizes.



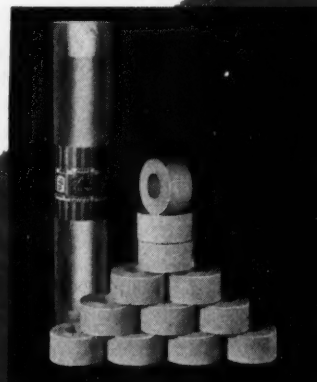
#### AIRCELL AND MULTICELL FIREBOARD

In Sheets and Blocks for Boiler and heater insulation. Also many types of ventilating ducts.



#### ASBESTOS PAPER AND ROLLBOARD

Put up in standard size rolls, 18", 24", and 36" widths. WEIGHTS: 8, 10, 12, 14, 16 and 32 pounds. (1/16" thick) 1/8", 3/32".



#### ASBESTOS PIPE JOINT TAPE

For covering hot air and cold air pipe joints. Standard width, 3". Package contains 1000 lineal feet.

Air C  
refrig  
lome

AIR CO



Model 2  
to 2 Tons



Mod  
3 to 6 Tons



Model 70-NA  
Model 70-N  
to 40 Tons  
"Freon"

Dep



The  
*Most Beautiful Thermostat*  
on the Market...plus  
*Accurate Control...*

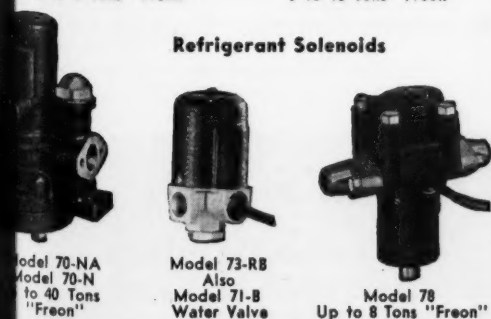
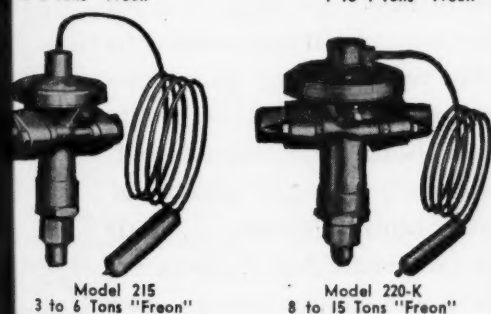
Available in models for heating, with or without  
heat anticipator, and for cooling.

Installations .  
**Great** or Small  
Are More  
Dependable with .

Air Conditioning  
Refrigeration  
Home Heating

**A-P Controls**

**AIR CONDITIONING AND REFRIGERATION CONTROLS**



A-P "Controlling Influence" covers three great industries: Air Conditioning, Refrigeration, and Home Heating. Whether your installation is a Million Dollars or only a few Hundred Dollars, it still requires the same accuracy of CONTROL.

Efficient, Accurate, Dependable Control Equipment made under A-P Micrometric and Precision Standards pays the "dividends" in results that your customer expects,—whether it's in Air Conditioning, Refrigeration, or Home Heating.

**AUTOMATIC PRODUCTS COMPANY**

2452 North 32nd Street

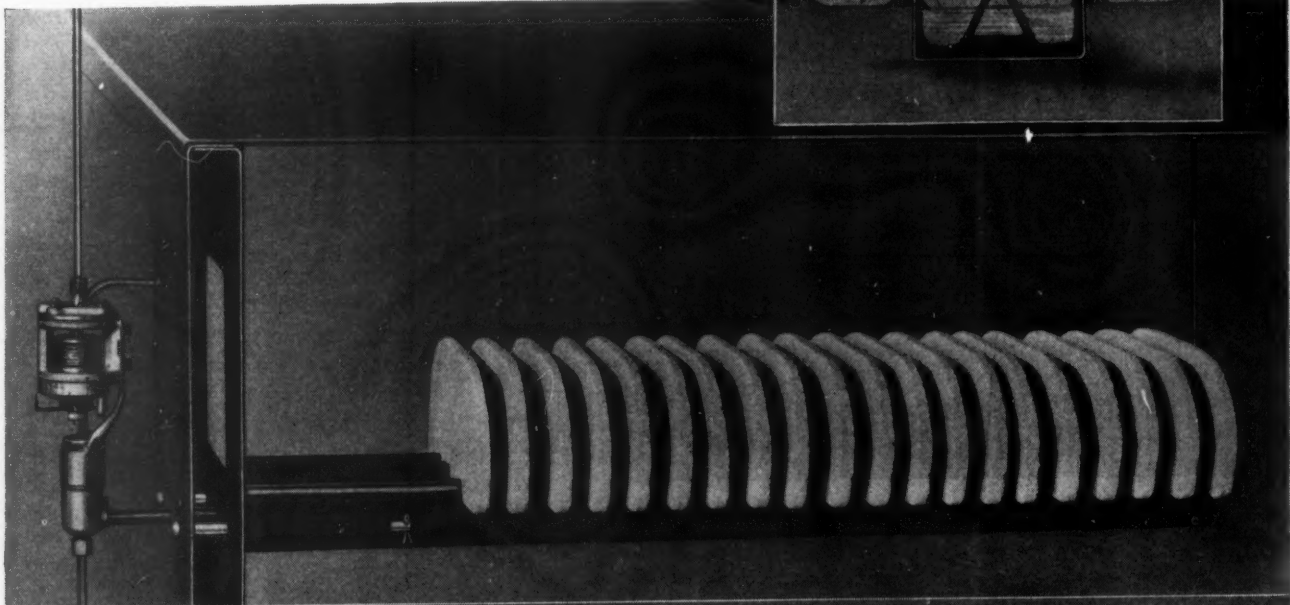
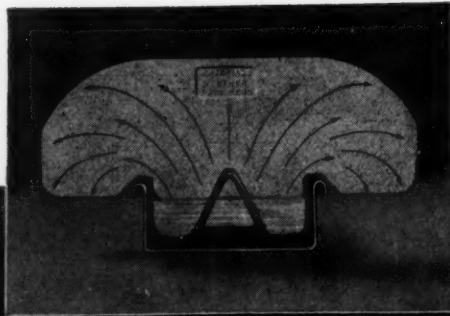
Milwaukee, Wisconsin

**Constant Level Oil Control Valves for All Types of Gravity Fed Oil Burning Equipment**



Dependability a By-word for **A-P Controls**

**IMPROVED VAPOR DIFFUSER** is scientifically proportioned to produce very rapid evaporation. Each plate will diffuse as much water vapor as 60 square inches of water surface in an open pan.



# AUTOMATIC



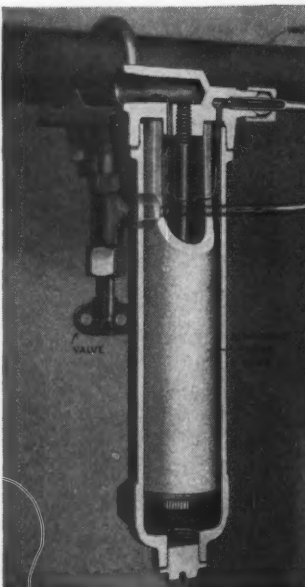
# JUNE

## HYDRO-METRIC HUMIDIFYING

## SYSTEMS

*Scientifically Designed* TO PRODUCE  
CORRECT HUMIDIFICATION IN ALL WEATHERS

Humitor, in living room, gives convenient control. Water dripping is plainly visible in sealed glass tube. Dial indicates rate. Filter clears water of even finest particles. Prevents clogging at any point.



● This is the way Automatic June performs—In severely cold weather when high bonnet temperatures cause rapid evaporation, Automatic June limits evaporation to avoid excessive condensation on windows and in outer walls. In mild weather when low bonnet temperatures allow evaporation to lag, the plus area presented by the vapor diffusers provides all the necessary humidification required. In every weather condition exactly the right amount of water is evaporated for correct humidification . . . With many other superior features Automatic June fully meets the requirements of modern air conditioning. Two types, Room Control and Basement Control. Send for new literature.

### MONMOUTH PRODUCTS CO.

1933 East 61st Street

Cleveland, Ohio

These ph  
ordinary  
and clear  
the Almar  
ONLY. 10  
were put  
at 8:15 A  
ACCURAT  
made on  
A. M., or  
my hand  
ALMAR C

To Residen  
We are ple  
—capacity  
low priced.  
Also Stand  
Heavy Duty  
Write for Bu

The compl  
at the H  
Booth 435.

CHIC



# ALMAR CORNER LOCK FORMING MACHINE



MODERN MANUFACTURING METHODS  
MAKE MONEY FOR YOU AND GIVE YOUR CUSTOMERS  
BETTER AND NEATER WORK

The ALMAR Corner Lock Forming Machine has been in operation from 1 to 2 years in many shops throughout the United States and has proven its efficiency, practicality and economy.

You are interested in past performances in a machine of this type and we can gladly supply detail regarding customer experience upon your request. REMEMBER there is only one ALMAR machine

See our advertisement on page 178.



These photographs were made under ordinary sheet metal shop conditions and clearly demonstrate the speed of the Almar. With the use of ONE MAN ONLY, 100 sheets of 22 gauge Galv. were put through the Almar starting at 8:15 A. M. and UNIFORM, OPEN, ACCURATE, HAMMER LOCKS were made on each sheet, finishing at 9:00 A. M., or a total of 45 minutes, including handling. This proves HOW THE ALMAR CAN MAKE MONEY FOR YOU.

## NOTICE

To Residential Air Conditioning contractors. We are pleased to announce our Junior Model—capacity 24-28 gauge material inclusive—low priced.

Also Standard Almar—20 gauge Capacity. Heavy Duty Almar—16 gauge Capacity. Write for Bulletin 17.

The complete Almar line will be on exhibit at the Heating & Ventilating Exposition, Booth 435.



Courtesy of Alcoa Co., Chicago

## WARD MACHINERY COMPANY

MACHINES — TOOLS — SUPPLIES FOR SHEET METALS EXCLUSIVELY

564 W. WASHINGTON BOUL.

CHICAGO

ILLINOIS



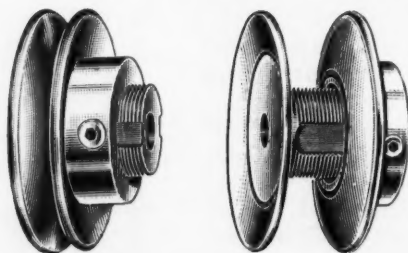
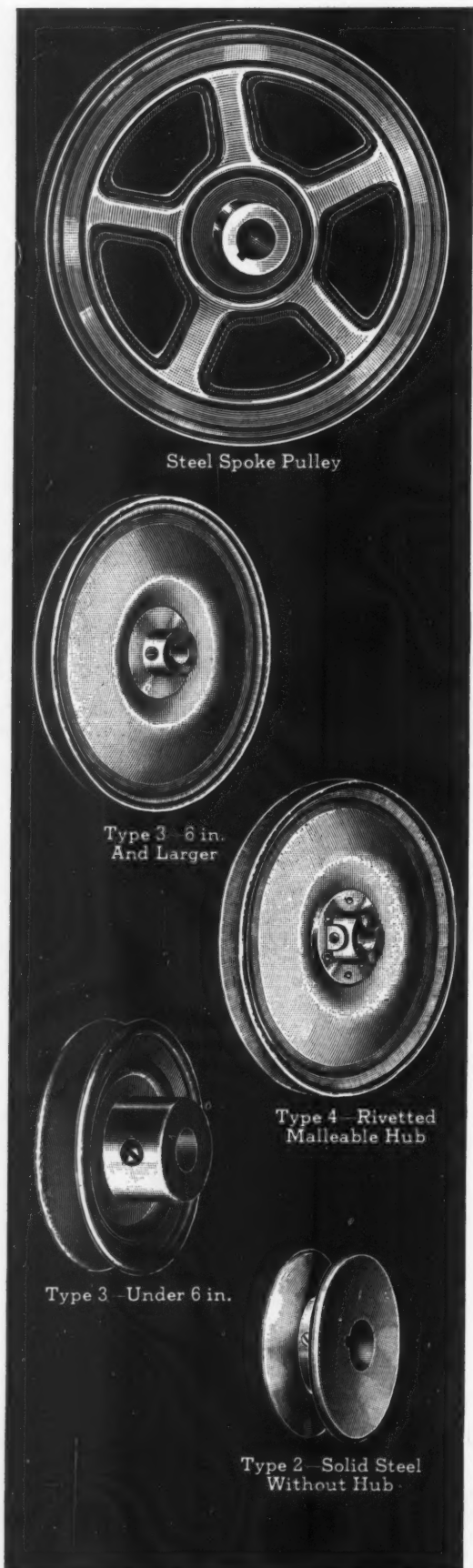
# MAUREY *All Steel* UNIVERSAL V-PULLEYS

**Designed and Built to Give  
Maximum Service with Stoker,  
Blower and Air Conditioning  
Units**

Builders of products that **MUST** operate continuously and without risk of failure, naturally turn to MAUREY Universal V-Pulleys for their F. H. P. Motor transmission. During the past six years MAUREY Pulleys have shown manufacturers of all kinds of Air Conditioning Units, Blowers and Stokers the way to quiet, efficient, trouble-free pulley operation.

Made of steel with heavy rolled edges, MAUREY V-Pulleys have hubs of **SOLID STEEL** or malleable iron, machined for true-running accuracy. They are designed and built to give top performance under severest conditions in daily continuous use. **No die cast hubs are used in MAUREY Pulleys.**

A wide variety of sizes carried in stock for both "A" and "B" belts. You will find MAUREY Pulleys surprisingly low in price. **Write for circular giving detailed description and prices.**



## MAUREY All Steel Variable Pitch Diameter Pulley

ORIGINATED, developed and perfected by MAUREY, this superior Pulley is designed and built for work that demands continuous trouble-free performance wherever installed.

Made of **SOLID STEEL** for strength and long wear; adjustable to permit speed variation of as much as 30%. Machine turned throughout with accurate milled threads—20 to the inch for close adjustment. Hexagon hollow head set screw fits into machined keyways, making perfect non-slipping adjustment without damage to threads. Used with either "A" ( $\frac{1}{2}$ " ) or "B" ( $\frac{11}{16}$ " ) belts. In four sizes— $3\frac{1}{4}$ ",  $3\frac{1}{2}$ ", 4",  $4\frac{1}{2}$ " in diameter.

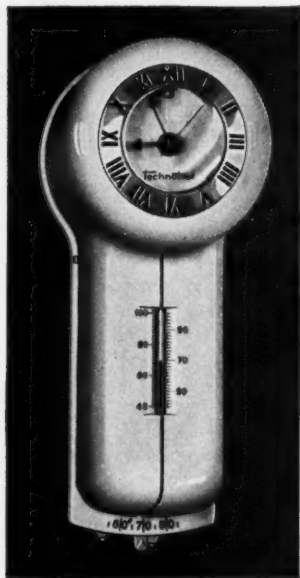
**MAUREY MANUFACTURING CORPORATION**

Wabash Avenue at 29th Street

Chicago, Illinois

# MASTER

## EFFICIENT, DEPENDABLE CONTROLS

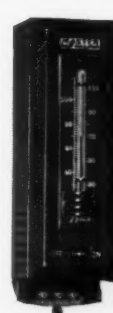


### Technotrol

Furnished in Ivory or black molded cases, Technotrol combines distinctive beauty with a fine instrument of precision. Responsive to minute changes in temperature. Technotrol is available in either the Type C-22 two-position model or the famous Type C-144 gradual control model. Also furnished with snap action contacts for 2 or 3 wire low voltage control systems.

#### TYPE B-144 Gradual Control

An instrument of precision performance and long life, it has four-position smoothness together with the unequalled sensitiveness of Master's patented Thermo-Wafer. Contacts are platinum-iridium. Special non-inductive thermal starting switch requires less than 3 watts. The four-pole induction motor operates at 16 volts through a special low-reactance type of transformer. Listed as Standard by Underwriters' Laboratory.



Plain  
Model



Type B-144  
Motor



Type B-22  
Motor

1-day Clock  
Model

Plain  
Model

#### TYPE B-22 Two Position

A MASTER instrument with the appearance, accuracy and reliability characteristic of the entire line. Priced for the greatest market of all—moderate salaried home owners. Has fine silver contacts, and 1 degree temperature range response. Motor is quiet with ample power to lift any damper.

In addition to standard line, we furnish quotations on regulators for special applications. We also manufacture the Type 22-A and 22-W Limit Controls.

**WRITE FOR FURTHER INFORMATION**

**THE WHITE MFG. CO.**

2362 UNIVERSITY AVENUE

ST. PAUL, MINN.



**DuraBilt**

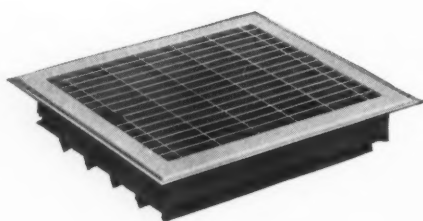


*A Little Young, but*

**A**

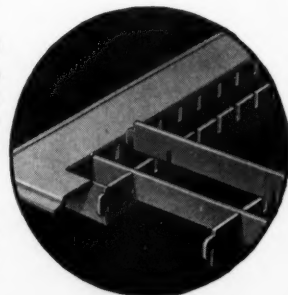
***Mighty  
Popular  
Model***

The famous AUER "DuraBilt" design is just a youngster in the Auer family—but a healthy one. It has thrived on a rich diet of demand. Heating contractors, architects, home owners christened it with instant approval. It adds to inbuilt AUER Quality a note of durability all its own. Interlocked cross-bar construction makes it exceptionally rigid, wear-and-tear proof. If you haven't used DuraBilt Floor Registers and Intakes—here's another invitation!



There are many other popular Auer models (including the "Classic") Registers, Intakes, Grilles—for all gravity and air conditioning uses. Ask for complete catalog. All Auer models shown at Grand Central Palace, New York, Jan. 24-28.

**THE AUER REGISTER CO.**  
Cleveland, O.



**AUER** DISTINCTIVE **REGISTERS**  
**& GRILLES**  **For Air Conditioning and Gravity**



# WARM YOUR FEET *in the snow!*



● The dealer who "burns up the pavements" during the winter months—systematically searching out new prospects and systematically checking up on recent installations—is sure to find that a well-directed business means a much more profitable business. Home-owners with old-fashioned furnaces are having their troubles now . . . and how! Call on them . . . by the house-to-house method if necessary. Offer to help tide them over their heating difficulties. You'll build goodwill that way, and sow the seeds for future sales. In checking up recent installations, take a look at the air filters, making replacements where necessary. If you, like most dealers, handle a DUST-



STOP equipped warm-air system, you'll find that replacements are easily and profitably made. DUST-STOP Replacement-Type Air Filters, now being offered by a majority of leading warm-air furnace manufacturers, are a source of steady, day-to-day, year-after-year profit for dealers everywhere. You, too, can share in this rapidly growing, highly profitable business. The coupon points the way. Mail it TODAY.

Owens-Illinois Glass Company . . . Toledo, Ohio.

**OWENS-ILLINOIS**  
**DUSTOP**  
REPLACEMENT-TYPE  
**AIR FILTERS**



OWENS-ILLINOIS GLASS COMPANY  
Industrial and Structural Products Division  
301 Madison Avenue, Toledo, Ohio

Please send, without obligation, all the facts about DUST-STOP Replacement-Type Air Filters.

Name \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_

# Practical and Dependable

—Yet they cost no more

Automatic Humidifiers      Water Line Controls

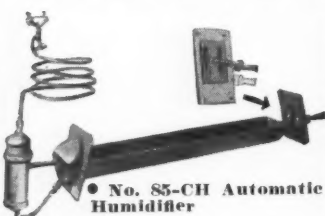
That's why leading manufacturers and dealers have adopted Maid-O'-Mist devices as standard equipment. Easily attached and adjusted to individual needs. Automatic in operation. Built to avoid corrosion, and give trouble free service. Still they are moderately priced and profitable to handle.

The complete line includes automatic humidifiers for hot water, warm air and steam heating plants. Also automatic water feeders, low water cut-outs, air vents, etc.

**Send for FREE CATALOG A-1 and complete specifications and prices including liberal discounts.**



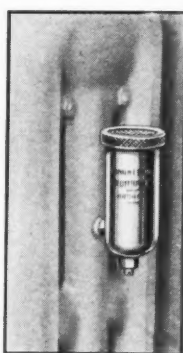
• No. 9 Zephyr Automatic Humidifier •



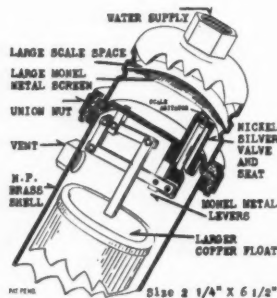
• No. 85-CH Automatic Humidifier •



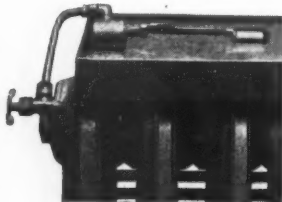
• No. 11 Zephyr Twin •



• No. 95 Auto-Vent Humidifier •



• The New Type No. 85 Water-Boy Feeder •



• No. 53 Water-Pan Feeder for Radiators •



• No. 8 Pipe Saddle Valve •



• No. 55 Midget Water Feeder •

## • No. 9 Zephyr Automatic Humidifier

For all types of furnaces. Pan, 4"x36", stamped from genuine sheet bronze (nine times as efficient as cast or sheet iron in heat transmission). Heating area exceeds 350 sq. in. Patented air deflectors. Patented adjustable overflow plate prevents over-saturation. Adjustable hood fits slope of furnace bonnet. Water supplied by new type Water Boy Safety-feeder, with water line adjustment and located away from heat to avoid corrosion. Equipment includes saddle valve, copper tubing, complete fittings. LIST PRICE \$15.50.

## • No. 85-CH DeLuxe Humidifier

Is the same as the Zephyr and in addition includes our No. H-4 Automatic Humidistat control, No. 640 Solenoid valve, No. 31 Pressure Reducing Valve and No. 4 Filter. LIST PRICE \$50.00.

## • No. 85-CH Automatic Humidifier

Same design, construction, materials, as No. 9 Zephyr, excepting deflectors. Evaporating area 126 sq. in. Complete with all fittings. Patented adjustable overflow plate as illustrated. Very efficient for gravity heating furnaces. LIST PRICE \$13.20.

## • No. 95 Auto-Vent Humidifier

For steam radiators. Takes place of air valve. Automatically vents air from radiator and humidifies. Easily adjusted by set screw at bottom of valve. LIST PRICE \$4.20.

## • No. 11 Zephyr Twin

No. 11 Zephyr is a double unit fed by one Water-Boy. Each humidifier can be raised or lowered independently of the other to reduce evaporating area. For large residences, and gas-fired furnaces. LIST PRICE \$22.00.

## • The New Type No. 85 Water-Boy Feeder

is just another step forward in a small, attractive, positive-acting, corrosion resisting water line control valve. It is the result of long experience in manufacturing of water feeders. All working parts mounted on a replaceable bonnet. It is finished in satin nickel. LIST PRICE FEEDER ONLY \$8.00.

## • No. 53 Water-Pan Feeder for Radiators

Automatically vents the air from the hot water radiator and keeps the humidifying pan full of water. Float is adjustable. Nickel-plated finish. LIST PRICE \$3.00.

## • No. 8 Pipe Saddle Valve

To attach Pipe Saddle valve to 1/2" and 3/4" water pipe, drill hole in side of pipe, and fasten saddle bolts. Outlets for 1/4" O.D. copper tubing. LIST PRICE \$1.15.

## • No. 55 Midget Water Feeder

For bucket or pan type humidifiers. Midget ball cock, 7" long over all. Of Monel Metal, Nickel Silver, Brass, and Copper. Float adjustable for water depth 1" upward. Easily installed. LIST PRICE \$2.25.

# MAID-O'-MIST Inc

180 N. Wacker Drive

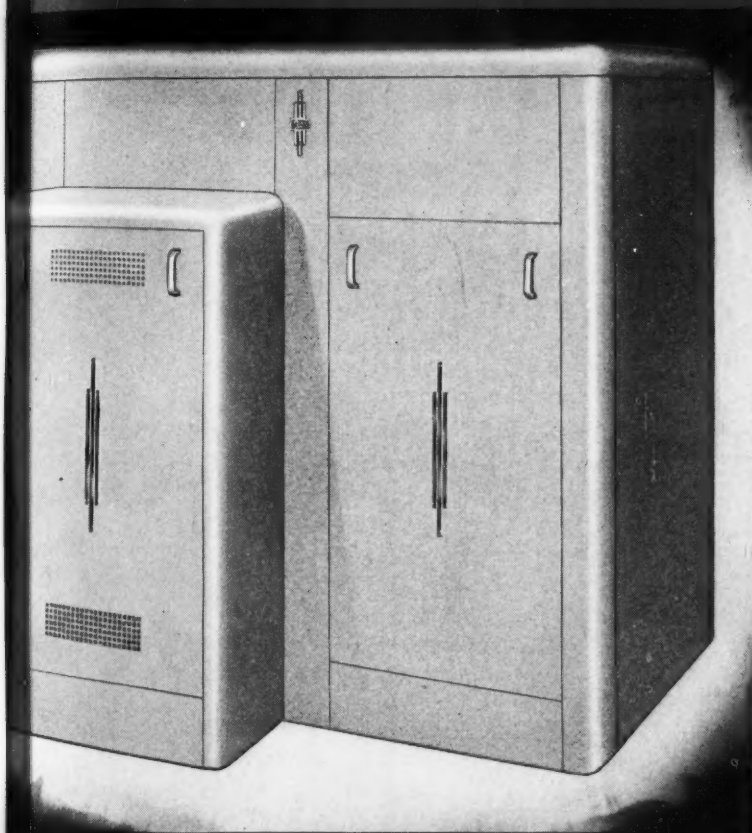
Chicago, Illinois

# PEERLESS

—THE LINE THAT'S

★ *Easy to Sell*

★ *Easy to Service*



*Easy to sell* because Peerless furnaces and winter air-conditioning units are modern-to-the-minute in appearance, in sound heating and combustion engineering, in completeness of equipment, and in economical, trouble-free operation. *Easy to sell because they are priced right.*

*Easy to service* because each Peerless furnace is built of best materials, and designed for easy and quick replacement of parts. *Easy to service* because Peerless maintains a large and complete stock of parts for prompt shipment to any part of the country.

## 3 BEAUTIFUL *Streamline* UNITS That Have "Everything"

... For GAS, OIL, or COAL

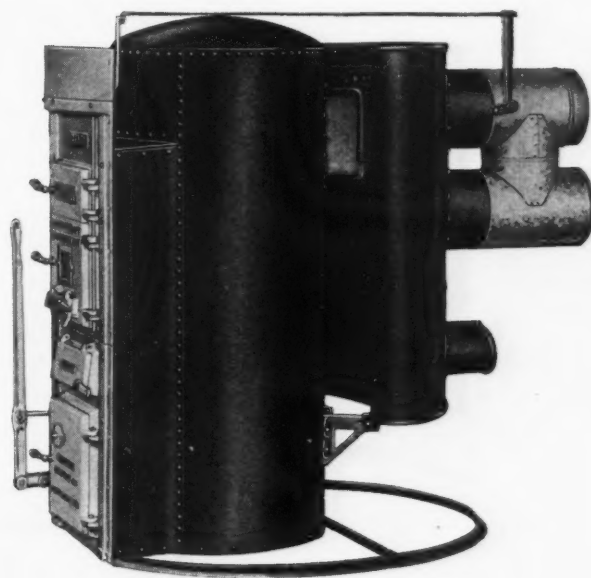
The new Peerless Streamline OIL burning air-conditioning unit shown *at left* is duplicated in beautiful design, handsome green-morocco finish, and sound engineering—for GAS or COAL and COKE. Each unit is a completely automatic winter air-conditioning furnace, with thermostatic control, humidifier, powerful silent blower, etc. Each offers the utmost in fuel-economy and heat utilization—at prices that are fully competitive with the best the market affords.

★ A COMPLETE LINE OF HEATING AND AIR-CONDITIONING FURNACES FOR *Every* TYPE OF HOME... ★

Every dealer knows the important sales advantage of having *anything a customer may want*—all under one well known and respected name. That is one of the biggest advantages in handling The PEERLESS line.

PEERLESS is one of the oldest and largest manufacturers of stoves, furnaces and air-conditioning equipment in the mid-west. No matter what your customer wants, Peerless has it in stock, or will make it for you.

In addition to the three "Streamline" units, representing the "last word" in air-conditioning equipment, using Oil, Gas or Coal, PEERLESS builds a full line of conventional round furnaces in all sizes, to sell at a wide range of prices. The PEERLESS line also includes oil burners, stokers, blowers, filters, combination blower and filter units, humidifiers, thermostatic controls, etc., thus giving PEERLESS dealers unusual sales and profit opportunities.



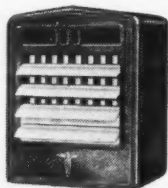
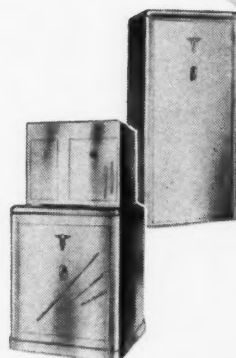
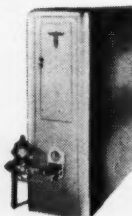
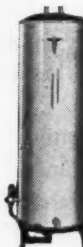
PEERLESS FOUNDRY COMPANY • INDIANAPOLIS, INDIANA

PROVIDING FILTERED "JUNE" AIR



THROUGHOUT HEATING SEASON



**WANTED****DEALERS  
DISTRIBUTORS****TO SELL THIS COMPLETE LINE OF Janitrol  
GAS HEATING AND AIR-CONDITIONING EQUIPMENT****IN THESE  
TREMENDOUS  
MARKETS**Backed by  
National Advertising Campaign  
Blanketing More  
Than 3,000,000  
Preferred  
ProspectsSupported by  
Greatest Merchandising and Sales-  
Training Program  
in the History of  
the Gas IndustryOffering  
Experienced Engineering Cooperation  
for Planning and  
Installation**JANITROL GAS-FIRED WINTER  
AIR CONDITIONERS**Handsome, compact, easily  
installed... Completely auto-  
matic control, circulating  
clean, warm, humidified, fil-  
tered air to every room at  
even temperature.**JANITROL GAS-FIRED GRAVITY  
HEATER**A dependable, moderate-priced  
unit for home owners desiring the  
advantages of modern automatic  
gas heat.**JANITROL GAS-FIRED  
UNIT HEATERS**Ideal for every type of  
commercial or industrial  
establishment from small-  
est shop or store to large-  
est factory... Suspended  
from ceiling. Save space.  
Provide comfort, health, efficiency.**JANITROL  
GAS-FIRED CONVERSION  
BURNERS**—A size and type  
suitable for conversion of  
any house-heating unit in-  
to a gas-fired  
unit... More  
than 125,000  
in use.**Write for...**full information about the complete  
Janitrol line and Janitrol engineering co-  
operation. Get details of the remarkable  
sound-slide-film and chart-lecture sales-  
training program and the great merchand-  
ising and advertising program that make  
it well worth your while to concentrate  
your entire sales effort on Janitrol products.  
Surface Combustion Corporation, 2377  
Dorr Street, Toledo, Ohio.**JANITROL GAS-FIRED  
WATER HEATERS**Economical design.  
High efficiency.  
Large capacity.Great new  
building marketRemodeling  
marketResidential  
conversion and  
replacement  
marketCommercial  
market...  
shops, stores,  
restaurants,  
theaters, etc.Industrial market  
... spot heating,  
auxiliary heating,  
plant extensions,  
or complete  
factories**Janitrol**

Manufactured by

**SURFACE COMBUSTION CORPORATION**

for many years specializing exclusively in the manufacture of gas heating equipment

# Automatic Controls

for

## EVERY PURPOSE

**R**EGARDLESS of the size or type of automatic heating, ventilating or air conditioning system you install, there is a Minneapolis-Honeywell automatic control system for it. Each control system is selected to exactly meet the individual requirements of the installation. Be sure you include complete automatic Minneapolis-Honeywell controls on every job. They are your assurance that

the system will function at its best, with the greatest efficiency, economy and trouble free performance. The Minneapolis-Honeywell Engineer in or near your city is available for consultation at all times. Call him in. Minneapolis-Honeywell Regulator Company, 2726 Fourth Avenue South, Minneapolis, Minnesota . . . Branch and distributing offices located in all principal cities.

# MINNEAPOLIS-HONEYWELL

Control Systems

NATIONAL PNEUMATIC CONTROLS

BROWN INDUSTRIAL INSTRUMENTS

THE ONLY  
TRAINING PROGRAM  
IN THE AIR CONDITIONING FIELD

*Actually*  
SUPERVISED BY—



*Factory*

ENGINEERS *and* EXECUTIVES

• • •  
"OFFICIALLY" ENDORSED BY MORE THAN 70 LEADING MANUFACTURERS

It should mean a great deal to an employer faced with the problem of building a capable and dependable service or sales organization to know that a selected group of hand-picked men are being prepared for Refrigeration and Air Conditioning work by a Training Program which is *actually supervised* by a *manufacturer-appointed Board of Governors*.

It should be a source of great satisfaction to an employer to know, also, that this same Board of Governors is made up of some of the best engineers and executives in the Industry, and that the entire Training Program which they are directing, is "officially" endorsed by more than 70 leading manufacturers in the field of Refrigeration and Air Conditioning.

• This vitally important point is sufficient proof of the fact that the Refrigeration & Air Conditioning Institute is training men the way the Industry wants them trained—just the way these manufacturers would train them if they were actually doing the job. As a leading manufacturer recently put it—"What you are doing is creating a new type of Craftsman—the kind of trained man so badly needed by this Industry."

Yes! We are giving the Industry a new type of Craftsman. He is not a plumber, steamfitter, sheet metal worker, or elec-

• • •  
If you do not have a copy of the Institute's "Report to the Industry"—a 200 page cloth bound book with 17 big photographs—please ask for it on your letterhead.



trician, but in a way, a composite of all these crafts insofar as they are employed in air conditioning work. R.A.C.I. graduates know heating, ventilating, and cooling as applied to air conditioning—know it from the practical as well as the theoretical standpoint. Each will have spent over a year in STUDYING, and four solid weeks in our Shops IN DOING. Each will have actually worked (in our Shops) on practically every type of equipment in use today—installing, servicing, repairing, etc.

Before he is admitted for Training by the Institute, a man must satisfy us, through careful investigation, that he is of high character, ambitious, a hard worker, mechanically inclined, of good education, and *capable of thinking for himself*; also, he must be a man who can be depended upon to be a loyal and trustworthy employee.

The record of every man trained by the Institute—including his photograph, our rating of his ability, what his references had to say about him—in fact, everything that you as an employer would like to know—is available upon request. It is the Institute's desire that every employer in the Industry should feel free to call upon the Institute for help with their employment problems. This service is free to employer and graduate alike.

Members of the Industry and their staff are cordially invited to visit the Institute and inspect its facilities, when they are in Chicago.

*Ray K. Smith*  
President

REFRIGERATION & AIR CONDITIONING INSTITUTE

2130-2158 LAWRENCE AVENUE

CHICAGO, ILL.



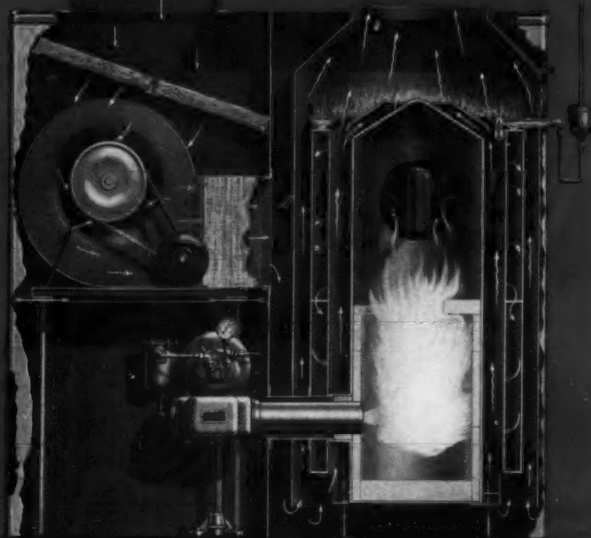
# MADE TO SELL ON SIGHT AND STAY SOLD



HEIL  
MODEL X  
OIL BURNER



HEIL  
DIRECT-FIRED  
FURNACE-BURNER UNIT



Heil Quality Built oil heating and air conditioning equipment has the eye-appeal to attract prospective customers as well as efficient design coupled with sturdy construction to insure satisfactory service! . . . Observe the streamline design of the popular Heil Model X oil Burner illustrated above — This is truly a class burner, priced for the mass market! Also observe the fine appearance and the efficient operating features of the Heil direct-fired furnace-burner unit, illustrated to the left . . . These fast-selling Heil units together with a complete series of conversion oil burners and boiler-burner units are at your service ready to build for you, in your community, a sound and profitable business . . . By all means inspect Heil units on display in booth number 23 at the International Heating & Ventilating Exposition and see for yourself why the Heil line is being received so enthusiastically by dealers everywhere . . . If you cannot attend the Exposition send at once for complete details concerning the profitable Heil dealer franchise . . . Address:

## THE HEIL CO.

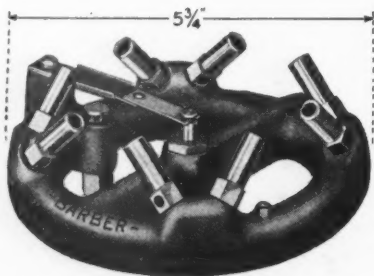
General Offices: 3014 W. Montana St., Milwaukee, Wis.  
Factories: Milwaukee, Wisconsin, Hillside, New Jersey

Heil Quality Products: Oil Burners — Boiler-Burner Units — Furnace-Burner Units — Air Conditioning Units — Water Systems — Gasoline and Fuel Oil Transportation Tanks — Hydraulic Dump Units — Hydraulic Scrapers — Bottle Washers — Stainless Steel Tanks — Snow Plows — Dehydrators . . . Free literature sent anywhere on request.

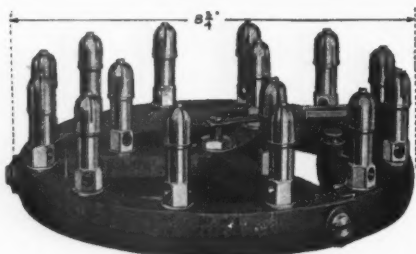


# HEIL OIL HEATING AND AIR CONDITIONING

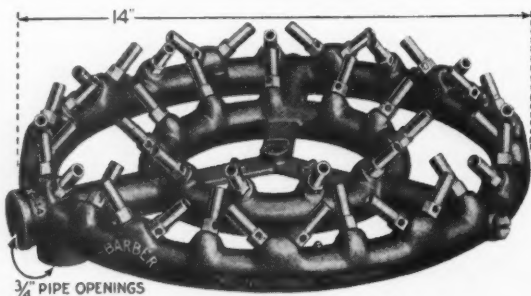
# WANTED—Your Problems on Gas Appliance Burners!



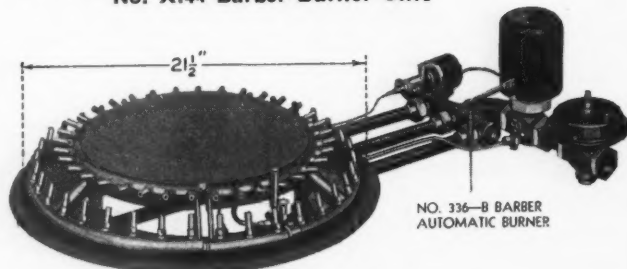
No. S. P.-15 Barber Burner Unit



No. C. P.-150 Barber Burner Unit



No. X.44 Barber Burner Unit



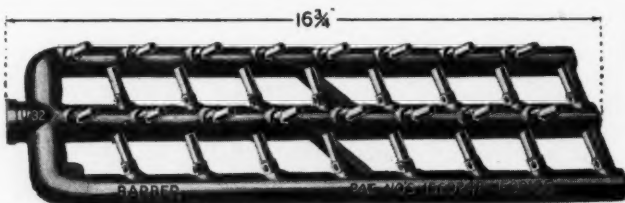
Conversion Burner for Round Furnaces or Boilers

Made in eight different sizes to handle round grate diameters from 12" to 34". Also tailor made to suit and fit the grate dimensions of oblong furnaces and boilers. Insures proper scrubbing flame action on side walls of firebox, and the 1900° Flame Temperature develops the highest possible efficiency and economy. Equipped with Baltimore Safety Pilot for positive and accurate Safety control. Listed in the A. G. A. Directory of Approved Appliances.

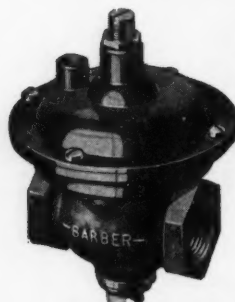
Expertness in design and development of Gas burner units has long been associated with the name of BARBER, Steadfast in its principle of Quality Manufacture, this Company has always stood for the exact *fitness of the Product* for its specific use. Two decades of experience with gas heating equipment and gas appliances have enhanced the facilities of Barber's Engineering Department, which are at your disposal, to contribute to the sales and service value of the product you make, sponsor, or sell. Avail yourself of this unique service!

It is our sincere purpose to cooperate closely with Appliance Manufacturers and with the Heating and Utility interests, so that our broad experience may be fruitful to *you* and *your* business. By the superiority of its products, plus a readiness to work with *you* on *your* problems, Barber keeps its old friends—and makes many new ones.

● Write for illustrated Catalog and Price List on Conversion Burners for Furnaces and Boilers, Burner Units for Gas Appliances, and Gas Pressure Regulators.



No. U-32 Barber Burner Unit

Barber Gas Pressure Regulators  
A. G. A. Approved

Made in the following sizes: 1/4", 3/8", 1/2", 3/4", 1", 1 1/4", 1 1/2", 2".

## BARBER BURNERS and Regulators are Adaptable to Such Appliances as:

- Air Conditioning Equipment
- High Pressure Boilers (Tubular and Tubeless)
- Bakery Ovens
- Doughnut Kettles
- Metal Pots
- Garage Heaters
- Coffee Urns
- Hair Dryers
- Space Heaters
- Floor Furnaces
- Clothes Dryers
- Water Heaters
- Confectioners' Stoves
- Vulcanizing Machines
- Pressing Machine Boilers
- Japanning Ovens
- Core Ovens
- Banana Room Heaters and many other Appliances

## THE BARBER GAS BURNER COMPANY

3704 Superior Ave.  
Cleveland, O.

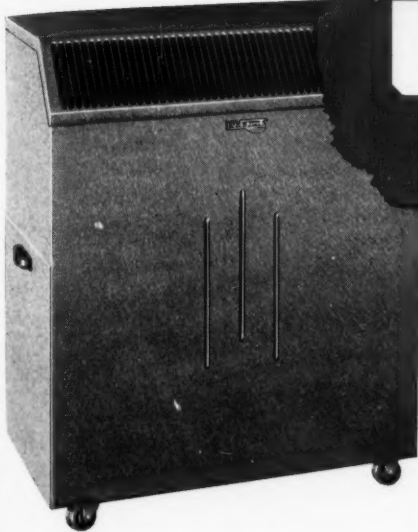
Address Michigan inquiries to:  
The Barber Gas Burner Company of Michigan  
4475 Cass Ave., Detroit, Michigan

# BARBER *Automatic* JET GAS BURNERS

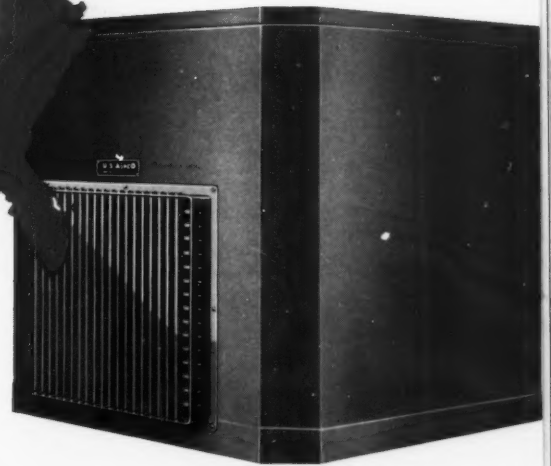
# NEW Business For YOU

*With*

**U.S. AIRCO**  
*Air Conditioning*  
**EQUIPMENT**



**U. S. AIRCO Portable Midget Room Unit**  
Self contained air conditioner for bed rooms, offices and hotel rooms. Takes fresh air from window, washes, cools, circulates. May also be used as humidifier in Winter.



**U. S. AIRCO Midget Kooler-Aire**  
Low cost commercial air conditioner for small stores. Lowers dry bulb temperature 75% of wet bulb depression by evaporative cooling. Small, light weight, easy to install.

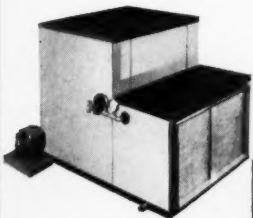
**Sell To  
STORES  
OFFICES  
HOMES**

U. S. AIRCO presents a line of quality air conditioning units that are designed right, built right, and priced to sell! You can get the cream of the fast growing demand from small stores, shops, cafes, bars, beauty parlors, offices, hotel and hospital rooms, etc., for efficient, low-cost air conditioning.

Back of all U. S. AIRCO Equipment is the seasoned engineering and proven performance of thousands of large air conditioning systems. Investigate the

U. S. AIRCO Dealer Franchise now.

Use the Coupon Below.



**HOME AIR CONDITIONER**

**U. S. AIRCO Home Air Conditioner (above)**

For warm air furnaces. Controls high-pass filter unit and washer-humidifier unit. 4 sizes.

**U. S. AIRCO Unit Air Conditioner (right)**

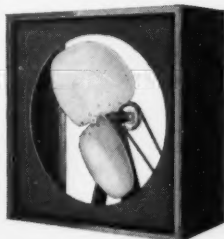
Cooling suspension type. Available with heating and cooling coils, humidifier and filters.



**UNIT AIR CONDITIONER**

**U. S. AIRCO Home Ventilator (right)**

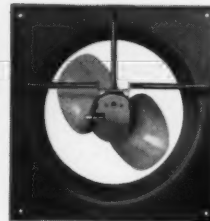
Placed in attic, exhausts heated air and draws in cool air. Range of 3 sizes.



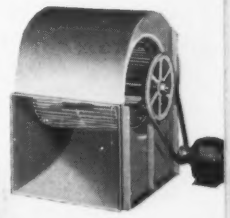
**HOME VENTILATOR**

**U. S. AIRCO Propeller Fan (right)**

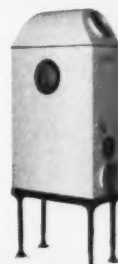
Blows exhaust for air lockers, stores, offices, factories, laundries, etc.



**PROPELLER FAN**



**LIGHT DUTY BLOWER**



**HEAT-SAVER HUMIDIFIER**

**U. S. AIRCO Light Duty Blower (above)**

For exhausts in confined air space. Several speeds available.

**U. S. AIRCO Heat-Saver Humidifier (right)**

Eliminates dry heat in private and public air heating systems.



**UNITED STATES  
AIR CONDITIONING CORPORATION  
MINNEAPOLIS MINNESOTA**

**UNITED STATES AIR CONDITIONING CORP.  
N. W. Terminal, Minneapolis, Minn.**

Please send catalog on U. S. AIRCO Air Conditioning Equipment and tell me about your Dealer Franchise. We are especially interested in

NAME.....

ADDRESS.....

CITY.....STATE.....



# 4

# Money

# MAKERS

## FOR 1938

**Lochinvar's** complete line of improved, fully automatic oil-burning and air-conditioning units designed for homes from \$4000 to \$15,000. These units can definitely increase your sales for 1938.

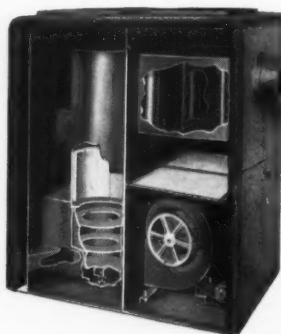
**MODEL 100 A**  
INTER AIR-CONDITIONING UNIT

The model 100 A furnace with its improved double casing cover, multiple-stage burner, fireproof filters, fire brick lined combustion chamber and rubber mounted blower is a champion for economy in the low price field. It will pay you to inquire about a franchise today. Height 57", Width 32", Depth 69 $\frac{3}{8}$ ".



*Junior-Aire*  
INTER AIR-CONDITIONING UNIT

Entirely automatic, dependable performance and economy of operation, this unit will increase your volume sales. Height 54", Width 32", Depth 53".



*Junior-Aire*

Another "money maker" is this chip off the block—The Junior-Aire. It is an exact duplicate of the famous 100 A in quality construction, but designed for homes in the \$4000 to \$6000 bracket.

**MODEL 100**  
COMPLETE OIL-BURNING FURNACE UNIT

Attractively finished in green ripple finish with black trim, this furnace has been well received by builders and homeowners everywhere. Height 64", Width 36", Depth 41".

Costing less than an oil burner alone, this Lochinvar Model 100 is a highly efficient, dependable and entirely automatic air-conditioning unit. Here is a furnace that gives the maximum in heating efficiency because of the multiple-stage burner.



**Lochinvar WATER HEATER**  
AUTOMATIC OIL-BURNING

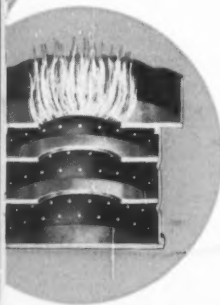
Easily installed anywhere, fully automatic and constructed to give a lifetime of service. Dimensions: Height 57 $\frac{1}{4}$ ", Width 23 $\frac{1}{4}$ ", Depth 20 $\frac{1}{4}$ ".



Entirely new in square design and green ripple enamel finish—here is a leader you can't afford to overlook!

*The Multiple-Stage*  
**BURNER**

The secret behind Lochinvar's long strides in the heating field is this exclusive patented burner, that contains no expensive moving parts to constantly service.



Lochinvar

**WE'RE MOVING—**  
To 14247 Tireman, Dearborn, Michigan, we will be in our new factory and office after January 1, 1938.  
We will look for you at the January Heating and Ventilating Exposition. Booths No. 502-503-504.

Lochinvar Corporation  
14247 Tireman, Dearborn, Mich.  
Gentlemen: Please send complete information and prices on the Lochinvar units.

Name \_\_\_\_\_  
Street \_\_\_\_\_  
City \_\_\_\_\_ State \_\_\_\_\_

**LOCHINVAR CORPORATION** 14247 TIREMAN DEARBORN, MICH.

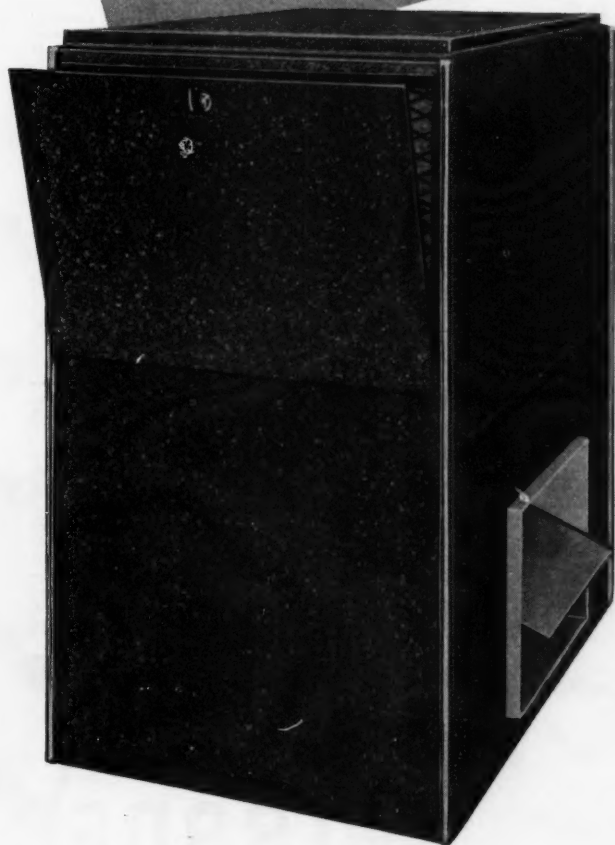
*Presenting the New*

**1938 REX AIRPAK**

**BLOWER FILTER UNIT** ... *with Automatic  
Modulated Control*



Be Sure to Inspect This  
Unit at Space No. 316-317  
of the 5th International  
Heating and Ventilating  
Exposition



**Provides Better Regulated  
Control Than an Expensive  
2-Speed Blower — and at  
a Much Lower Cost.**

Again REX AIR-PAK leads in simplified design . . . improved performance . . . and new economy! The new Modulated control represents one of the greatest forward steps in blower filter unit performance. The flow of air is automatically regulated by the bonnet temperature of the furnace. As the bonnet temperature gradually rises the flow of air gradually increases; as the bonnet temperature gradually drops the flow of air gradually lessens. In this way the air from the blower is proportioned to the heat produced by the furnace.

*Write Today for Complete Information!  
This New Unit Promises to Outsell Any  
Blower on the Market!*

- Modulated damper regulates the motor load. As the flow of air decreases the motor load decreases.
- Modulated damper prevents stratification and uneven temperatures.
- Side door openings compensate for inadequate cold air return. Permit easy accessibility to motor.
- Top mounting keeps motor off damp basement floor.
- Four-speed pulley provides variation in output.

*These and many other new features make REX AIR-PAK  
one of the outstanding accomplishments of the year!*



Division of

THE CLEVELAND HEATER CO.  
1939 W. 114th, CLEVELAND, OHIO

# A Complete

... THE TRANE COMPANY MAKES AVAILABLE FOR THE ENGINEER, ARCHITECT AND HEATING CONTRACTOR ACCURATE AND INCLUSIVE DATA ON HEATING, COOLING, AND AIR CONDITIONING EQUIPMENT AND APPLICATIONS. THE MATERIAL IS IN BULLETIN FORM, 8½" x 11" SIZE, CAREFULLY ARRANGED AND PROFUSELY ILLUSTRATED FOR CONVENIENT REFERENCE.

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Series of articles assembled in bulletin form. Thorough technical discussion of controls for every phase of air conditioning. Complete tables and engineering examples. Drawings show operation of each control system.

- ARTICLES BY WILLIAM GOODMAN  
Reprints of published articles covering interesting points in air conditioning. (1) "Air Conditioning Problems Solved by Spray Water—Air Chart." (2) "How to Avoid Trouble on Cooling Jobs with Evaporators above Condenser." (3) "Pumping Head on Air Conditioning Systems Reduced by Using Siphon." (4) "Solving the Four Types of Process Air Conditioning Problems." (5) "How to Solve Heat Transfer Problems." (6) "Dehumidification of Air with Coils." (7) "New Uses for the Psychrometric Chart in Simplifying Air Conditioning Problems."

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Write down the bulletin numbers you need on one of your letterheads  
and mail it to

The Trane Company, 2007 Cameron Avenue, La Crosse, Wisconsin  
or Trane Company of Canada, Ltd., Toronto, Ont.

**14.8% CO<sub>2</sub>**  
hour after hour shown in a recent laboratory test while firing a modern furnace.  
*Plus NO PULSATIONS*

# PERFORMANCE

*Never before* **EQUALLED**

That's real performance—the kind Aldrich challenges competition to equal! 15.5% CO<sub>2</sub> has always been considered combustion with no preventable waste—so recheck the figure above. A comparative test will show why Aldrich burners give such superior performance and economy. Advanced, simplified engineering is the secret.

In addition to unequalled performance you are now **guaranteed** absolute freedom from pulsations! Aldrich has found and **removed** the cause of pulsating fires. Gadgets and make-shifts to reduce the effect of pulsations are not to be compared with a design that removes the **cause**. Why put up with less than this unequalled performance? Aldrich **leads** consistently.

Get with the leader—investigate Aldrich today. Tremendous production and almost unequalled cash buying power plus original and advanced methods of manufacture make Aldrich-built burners cost little more—even less in some cases—than inferior burners.

Write or wire for details  
about the Dealer Franchise  
for this fastest selling line  
of better oil burners

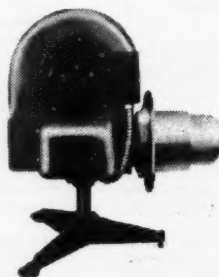
**WORLD'S**  
*Best Engineered*  
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## HEAT-PAK

The world's best engineered oil burner. Simple—efficient—economical. Interchangeable fans and blast tubes. Up to 6½ gallons fuel per hour capacity

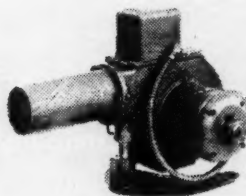


## COMPACT

All the advantages of the famous HEAT-PAK, yet small enough to fit into furnace or boiler casings. Flange or pedestal mounting—OR BOTH.

## PET

Choice of leading furnace and boiler manufacturers. Ideal for conversion jobs requiring up to 3 gallons fuel per hour. Aldrich features.



## GIANT

Accessible—removal of 2 screws gives easy access to ignition assembly. Aldrich features. Capacity up to 7 gallons fuel per hour





# TUTTLE & BAILEY

INCORPORATED

NEW BRITAIN, CONNECTICUT



## T & B SERVICE

### MEANS PROMPT DELIVERY

Now it is possible to avail yourself of all the T & B quality and of the refinements found in no other line of Air Conditioning Grilles, Registers and Intakes. All standard sizes of Registers stocked in prime coat finish, ready for immediate deliveries.

#### AIRLINE DESIGN

- Created especially for air conditioning
- Provides fixed air deflection
- Bars vertical or horizontal
- Large effective area
- Very moderately priced

#### FLEXAIR DESIGN

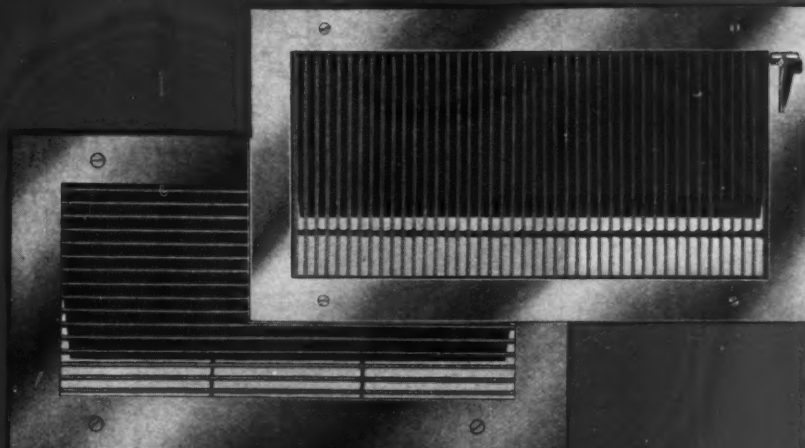
- Provides adjustable deflection at outlet
- Solid bar construction
- Bars vertical or horizontal
- Sanitary—easily cleaned
- Easily painted to match trim

#### ECONOMAIR DESIGN

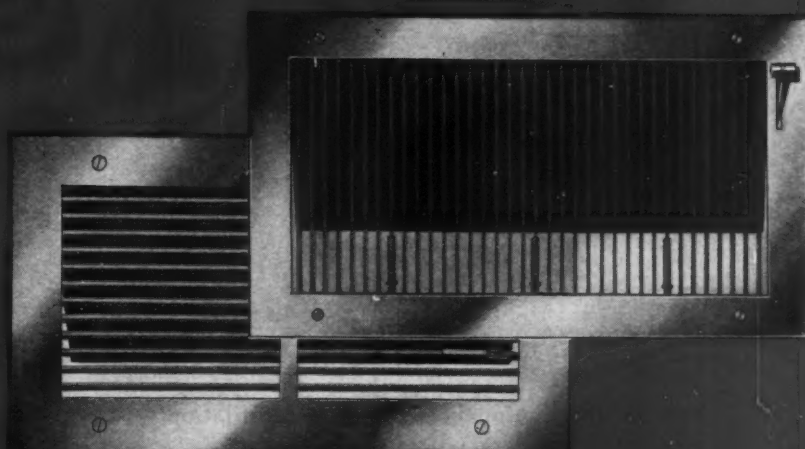
- Large effective area
- Extremely inexpensive
- Modern in appearance
- Easy to keep clean
- Easy to paint

#### SIDEWALL and BASEBOARD FRAMES

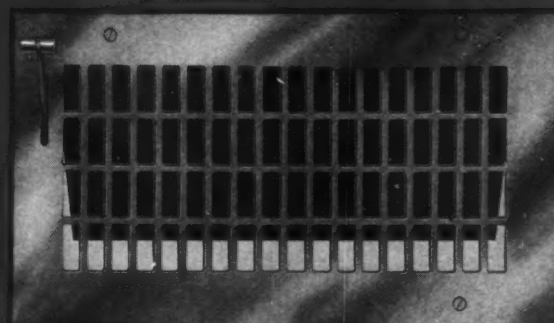
Tuttle & Bailey registers are provided with any one of six standard installation frames, most popular of which are the sidewall and baseboard frames shown below.



AIRLINE REGISTER

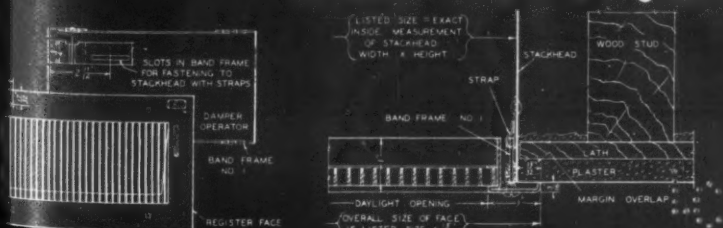


FLEXAIR REGISTER

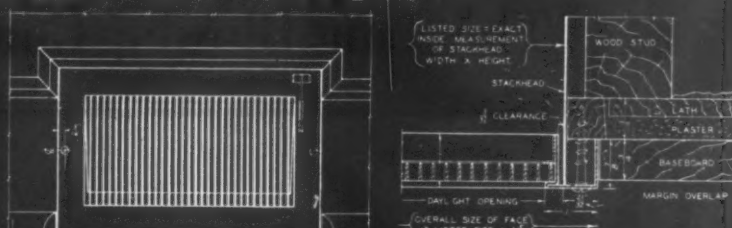


ECONOMAIR REGISTER

SEE YOUR JOBBER AT ONCE



FRAME No. 1. FOR SIDEWALL LOCATIONS



FRAME No. 3. FOR BASEBOARD LOCATIONS



**LAU presents...**

# BLOAIRE

*The Sensationally LOW PRICED  
Package Unit Furnace Blower*

*Less Than*

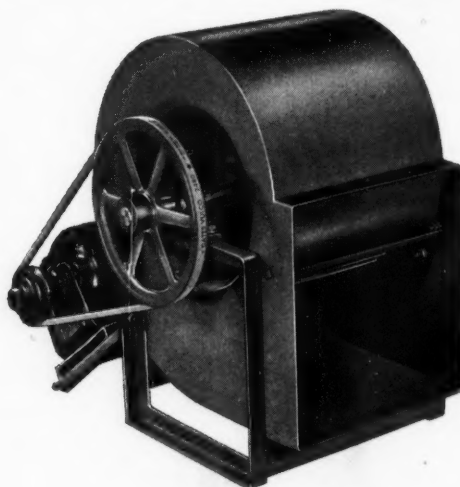
**\$40.**



Think of it! A centrifugal type blower (not a fan) that will meet the requirements of thousands of homes . . . a blower that will SELL at a price within the reach of everyone . . . a blower that will open a new field of sales for YOU!

1,000 C.F.M.—large enough for the many of thousands of existing unsatisfactory gravity jobs already installed.

See "BLOAIRE"  
at the  
International Heating & Ventilating  
Exposition  
Grand Central Palace New York City  
January 24th to 28th  
Booths 265-266



## A Complete Blower!

Including Motor, Filters, Blower Cabinet, Blower and full size access door. The attractive streamlined cabinet in its two-tone baked Morocco finish has eye appeal. Easy to sell . . . easy to install! BLOAIRE is also sold less casing, filters and motor.

Write Now for Complete Data and Prices

**The Lau Blower Company—Dayton, Ohio**

# SUPERFEX *again* *steps ahead*

AN IMPROVED OIL BURNING  
WARM AIR CONDITIONER *with*

**1** Longer Flue Travel

**2** Increased  
Radiating Surface

**3** Lower  
Stack Temperature

**4** New and  
Greater Efficiency

**5** LOWER ANNUAL  
FUEL COST

*These new advantages  
now in addition to...*

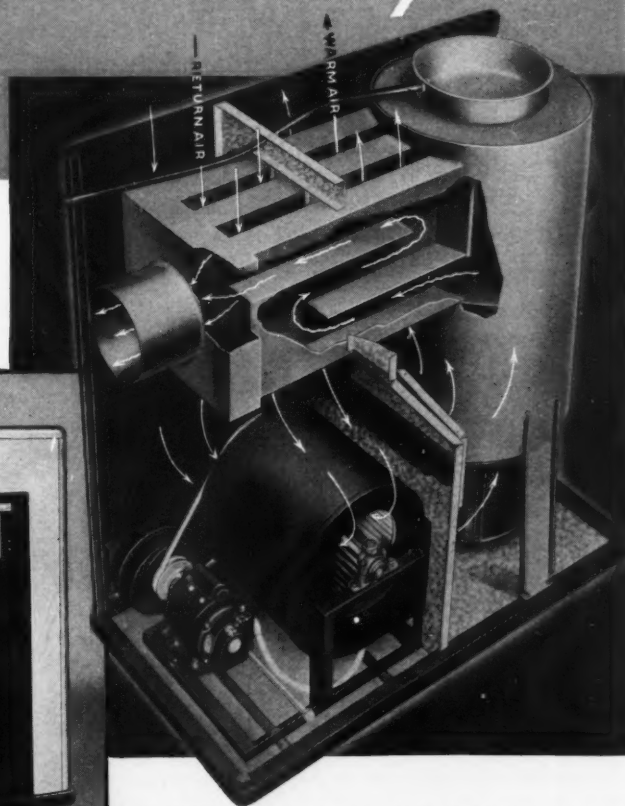
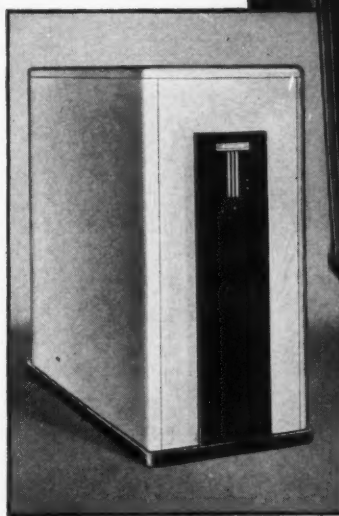
**6** 24 Hour  
Air Conditioning

The Mark

of Quality



**STEP AHEAD**  
*with*  
**SUPERFEX**



AT THE HEATING AND VENTILATING  
EXPOSITION • Booth 15-C • Main Floor

Home owners buy SUPERFEX because it does a complete job—delivers conditioned air 24 hours a day—not just the average 8. The SUPERFEX two-speed (high-low) oil burner automatically synchronized with a two-speed (high-low) blower has always produced outstanding fuel economy.

And now a longer flue of revolutionary design further increases SUPERFEX efficiency and *reduces fuel consumption*—with no increase in overall size. A complete unit which warms, humidifies,

circulates and filters the air. Three models with capacity at the registers from 65,000 to 140,000 B.T.U.'s. Built and engineered by the Perfection Stove Company, the world's largest makers of oil burning appliances. Easy to install at a good profit.

The new improved SUPERFEX combines *all* the features your customers want. It fulfills the most rigid requirements of winter air conditioning. And does it at extremely low fuel cost. See it at the Exposition or mail coupon for details.

PERFECTION STOVE COMPANY, • 7900-A Platt Avenue, Cleveland, Ohio.

Send me full details of the new SUPERFEX Oil Burning Warm Air Conditioner.

Name \_\_\_\_\_

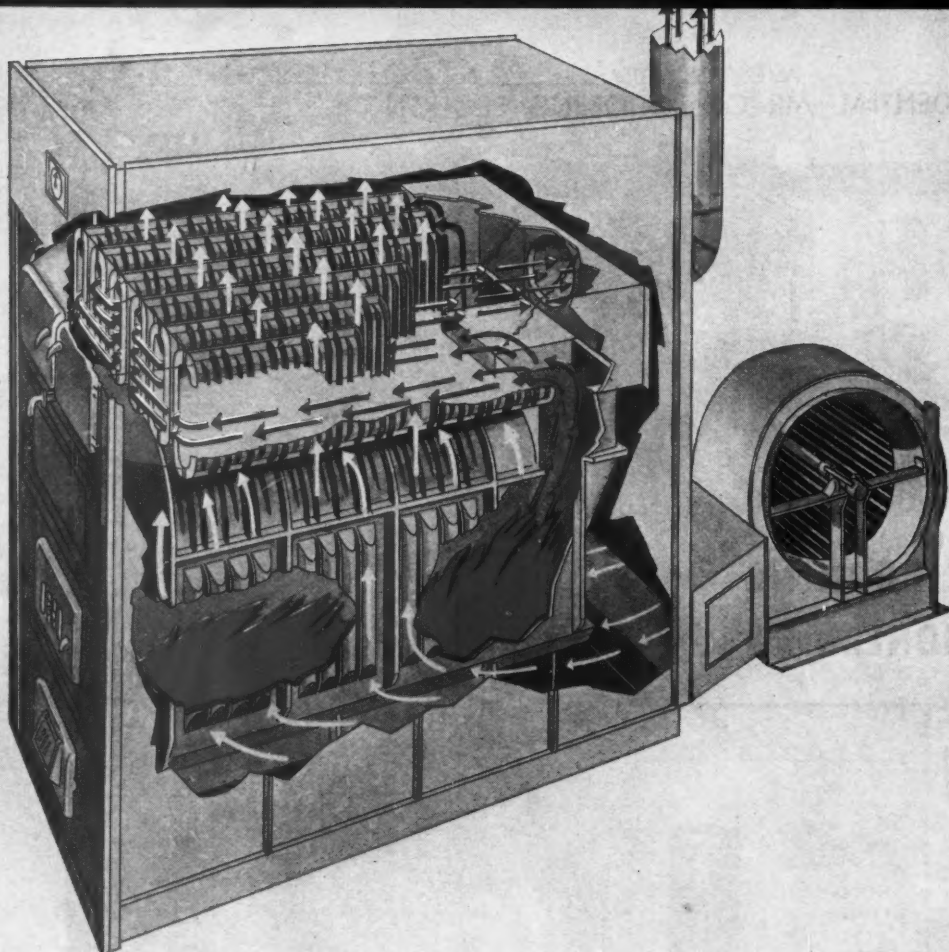
Street \_\_\_\_\_

City \_\_\_\_\_

State \_\_\_\_\_

# The ACME HEATER

*“It’s in  
the Fins”*



## Burns Any Kind of Fuel

The design of an all cast iron, direct transmission heater, such as the Acme, is not dependent upon the fuel to be used. Any fuel may be burned. Suitable grates may be provided so that bituminous, semi-bituminous, anthracite coal, or other solids may be used with equal efficiency. Replacement of grates and linings by proper refractory material permits use of stokers or oil burners.

## Large Combustion Chamber

Ample space is provided for the ignition of gases of combustion, regardless of fuel used. The combustion chamber, acting as “primary” heating surface, effects a very efficient transfer of heat, because of great temperature difference between burning gases inside the chamber and air passing over the outside surface.

## Efficient Radiator Section

Although the heating surface of the combustion chamber is large and

efficient, still more heat must be extracted to obtain satisfactory overall efficiency. The illustration above shows how gases of combustion enter rear smoke chamber, flow to front of the heater, and return again to smoke-box. Gases are held in intimate contact with the heating surface, six times the length of the heater, before they are permitted to escape.

## High Ratio of Heating Surface to Grate Area

The radiator tubes are covered with extended surfaces, or fins. The tubes of the radiator provide large heating surfaces and, when combined with the surface of the combustion chamber, afford a high ratio of heating surface to grate area.

## Balanced Construction

The construction of the Acme Heater provides ample free area and allows proper velocity of the air to be heated. Moreover, this air is brought into direct contact with as much heating surface as possible, resulting in the Acme of Efficiency.

Size No.	Dimensions			Grate Sq. Ft.	H. Surf. Sq. Ft.	Free Area Sq. Ft. Min.	Free Area Sq. Ft. Max.	Weight Pounds	Cfm. 100° Fahr. Temp. Rise	Maximum Capacity Btu.
	A	B	C							
5	6' 6"	4' 0"	5' 8"	7.56	260	6.55	10.25	5,800	6,000	700,000
6	6' 6"	4' 0"	5' 8"	9.39	260	6.55	10.25	5,850	7,000	800,000
7	6' 6"	4' 0"	5' 8"	10.31	260	6.55	10.25	5,900	8,000	900,000
7-A	8' 1"	4' 0"	5' 8"	10.31	340	7.73	12.50	6,900	9,000	1,000,000
8	8' 1"	4' 0"	5' 8"	11.91	340	7.73	12.50	6,950	10,000	1,100,000
8-A	9' 8"	4' 0"	5' 8"	11.91	430	8.91	14.75	7,950	11,000	1,200,000
9	9' 8"	4' 0"	5' 8"	13.06	430	8.91	14.75	8,000	12,000	1,300,000
9-A	11' 3"	4' 0"	5' 8"	13.06	500	10.20	17.00	9,100	13,000	1,400,000
0	11' 3"	4' 6"	7' 3"	14.43	500	15.82	22.62	9,300	14,000	1,500,000

### NOTES

The capacity rating of the Acme Heater has been determined by a series of tests conducted by an eminent consulting engineer. The efficiency curves from these tests show ratings given are conservative. Ratings are based on hand fired Bituminous coal containing 12,000 Btu. per pound. Combustion rate of 14 lbs. of coal per sq. ft. of grate per hour. Over-all efficiency at 60 per cent. Add 10 per cent to rating for stoker or oil burner. Prices on application.

## THE ACME JUNIOR HEATER

Size No.	Dimensions		Sq. Ft. Grate Surface	Sq. Ft. Mean Comb. Area	Sq. Ft. Heating Surface	Sq. Ft. Free Area C. Cham.	Sq. Ft. Free Area Rad. S.	Shipping Weight Pounds	Cfm. 100° Temp. Rise	Capacity E. D. R.	Normal Capacity Btu.
	A	B									
2	4' 6"	3' 0"	3	3.9	136	4.7	4.7	3,200	3,200	1,500	352,500
2-A	4' 6"	3' 9"	4	5.0	140	4.7	4.7	3,350	3,800	1,700	423,000
3	6' 0"	3' 9"	5	6.1	183	5.9	6.9	4,100	4,800	2,300	527,000
3-A	6' 0"	4' 6"	6	7.2	185	5.9	6.9	4,300	5,400	2,500	595,000
4	7' 6"	4' 6"	6	7.2	230	7.1	9.1	5,000	6,100	2,800	634,000
4-A	7' 6"	5' 3"	7	8.2	235	7.1	9.1	5,200	6,500	2,900	698,500
5	9' 0"	5' 3"	8	9.3	280	8.3	11.3	6,000	7,400	3,800	803,000

WRITE FOR COMPLETE DATA SHEET.

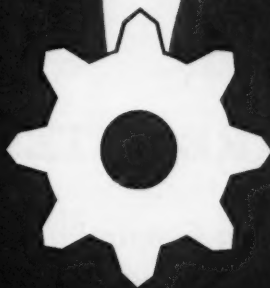
**THE ACME HEATING & VENTILATING CO.**  
1224-6-8 SO. LOWE AVENUE  
CHICAGO, ILLINOIS



THIS YEAR  
*even more*  
FOLKS WILL  
DEMAND



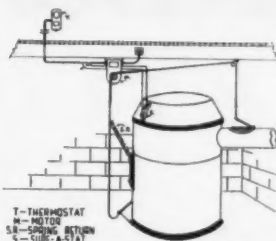
**CRISE CONTROLLED**



The Crise Floating Control Draft Regulator offers complete performance for hand fired warm air, steam or hot water plants using solid fuel. Motor has no transformer, no brushes or contacts. Does not have to complete its cycle when reversing—permanently oiled. The limit control prevents overruns of temperature, compensates for weather changes without adjustment. The thermostat is super-sensitive, single contact—no degree differential. Beautifully finished in either ivory or walnut. Very inconspicuous.



The Crise Floating Control is a very profitable unit for both jobber and dealer. Crise expects its dealers to enjoy a fine volume by fully protecting the sale of its products through legitimate channels of the heating trade. Send coupon today.



#### COUPON

Crise Electric Mfg. Co.  
320 S. Main St.  
Mt. Vernon, O.

Send my free 1938 Folder.

Company Name .....

Address .....

My Name & Title .....

THE CRISE ELECTRIC MFG. CO., 320 S. MAIN, MT. VERNON, OHIO

# U.S. SCORES AGAIN

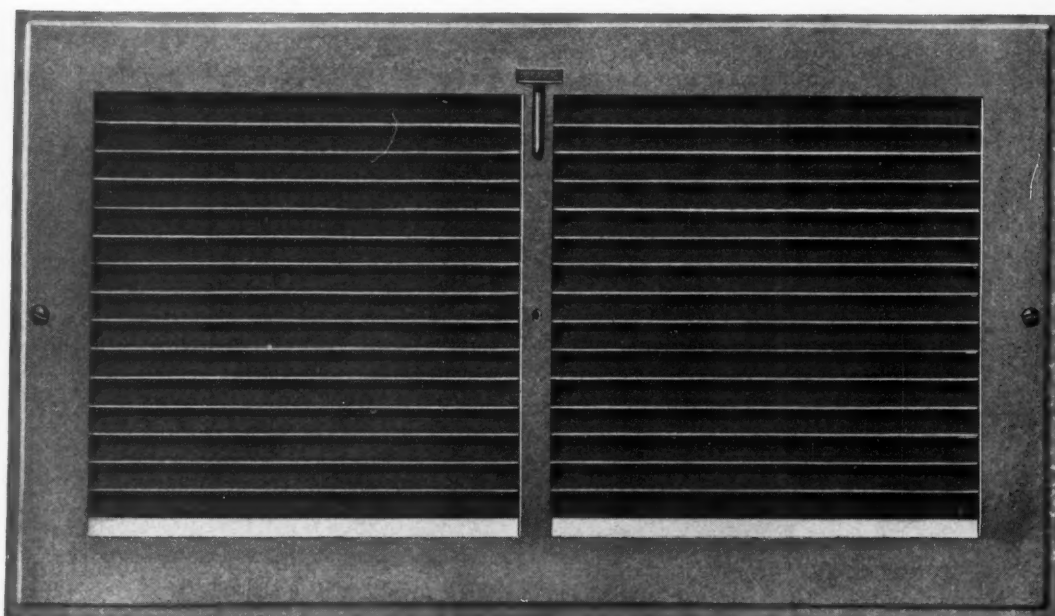
AT THE  
NEW YORK  
SHOW



WITH A  
"SMASHING HIT"  
OF WINTER WARMING AND  
SUMMER COMFORTING

**AIR CONDITIONING REGISTERS**

THE WORLD'S BIGGEST AIR CONDITIONING REGISTER  
A SURPRISE • SEE IT AT THE SHOW



## U. S. ADJUSTABLE BAR REGISTER

Up to 60 Degrees for Summer Cooling Comfort  
Straight or Down to Any Desired Angle for Warmth

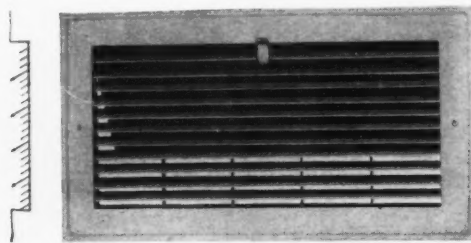
**A SIMPLE LEVER ACTION**  
**... "DOES THE TRICK"**

Could be adjusted Every Minute, Every Hour, Every Day, Week, Month or Year—  
STILL the Register Finish IS NOT DAMAGED, SOILED, or CUT. The Same Principles of adjustment in Vertical Styles of Directional Flow and Diffusional Adjustable BAR REGISTERS.

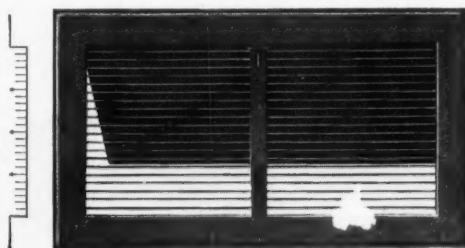
# All "FIN-TYPE" STYLES Furnished in All Desired Directional Flows and Equipped with SEALING GASKETS



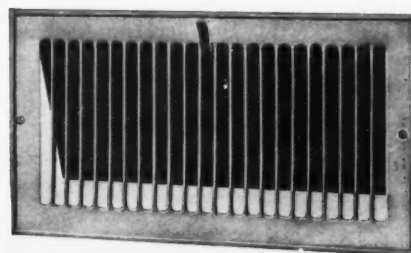
Style 119—Horizontal Close-Space Design



Style 120-0—Horizontal Open-Space Design



Style 153—Horizontal Louver-Stamped Design

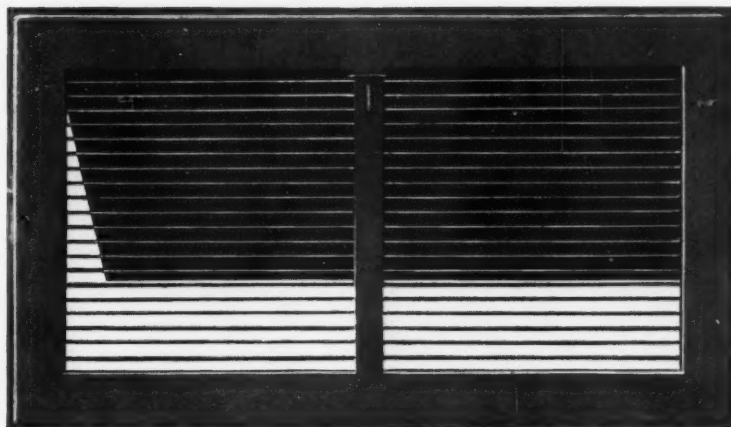


Style 102—Vertical Bar Design

## *The Outstanding, Amazing Value of the Year*

**IS** the NEW Close Space  
"LOUVER-STAMPED"  
AIR CONDITIONING  
REGISTER.

See it at our Exhibit No. 25 and sense the Value of this New Low-Priced Line and realize the Pleasant SHOCK of what modern equipment can do to Lower Costs and INCREASE VALUES.



A New Idea of Register Construction, that donates all Features of NON-VISION, Directional Flow, and Appearance demanded of Air Conditioning.

***YOU'VE GOT to See Them to Believe It!***

***"We'll Be Seeing You" in Little Old New York***



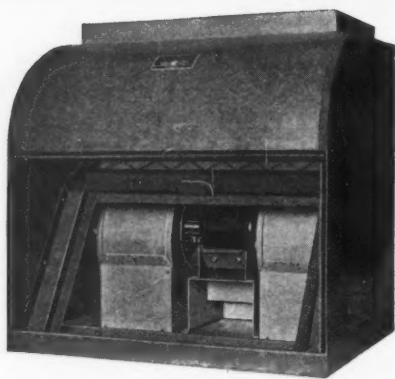
**UNITED STATES REGISTER CO.**

**BATTLE CREEK, MICHIGAN**

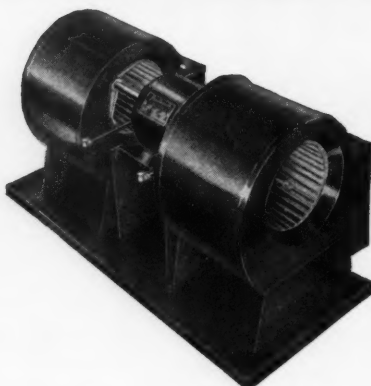
MINNEAPOLIS • KANSAS CITY • ALBANY • SAN FRANCISCO • NEW YORK, N. Y.



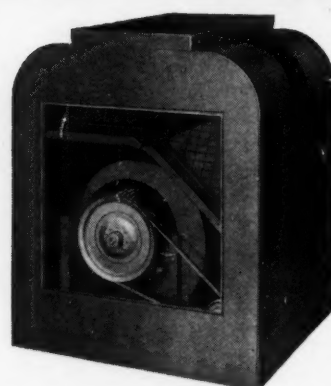
# Peerless AIR CONDITIONING PRODUCTS



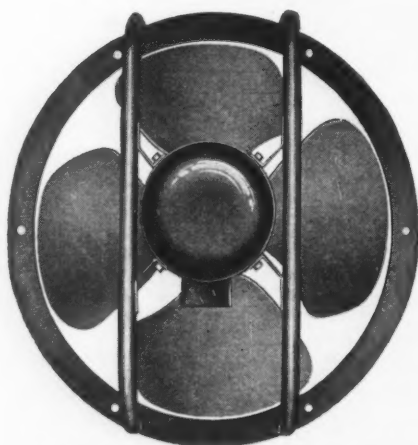
The PEERLESS Direct Drive Package Unit has automatic speed control and automatic control of air delivery — is quiet—reliable—efficient.



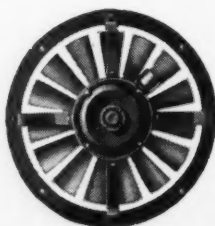
PEERLESS Direct Drive Panel Units can be supplied for either vertical or horizontal mounting—are supplied without cabinets or filters.



The PEERLESS Belt Drive Package Unit can be used with either new or old furnaces—a well balanced, quiet, compact unit.



A PEERLESS Four Blade Ventilating Fan in a modern new design—direct drive—can be supplied with either 16, 18, 24, or 30 inch diameter fan.



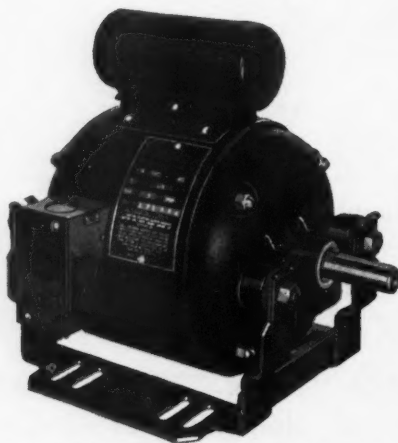
A PEERLESS Multiple Blade Exhaust Fan — direct drive — with silent capacitor motor—variable speeds—supplied with either 16, 18, 24, or 30 inch diameter fan.



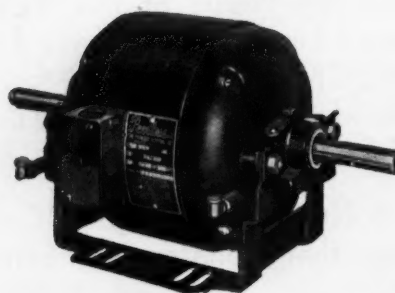
A PEERLESS Multiple Blade Belt Drive Fan in a new design—supplied with either 24 or 30 inch diameter fan.



PEERLESS Squirrel Cage Induction Motors are favored by machinery manufacturers for their reliability, super-performance, and fine appearance.



This PEERLESS Capacitor Motor of new design has a powerful starting torque on a low starting current—with a rubber cushion mounting and two speeds.



A PEERLESS Single Phase Motor with extended shaft—long life and wool-packed bearings — recommended for fans and blowers.

Representatives in principal cities.

West Coast Representative — MONTGOMERY BROTHERS  
61 Fremont St., San Francisco

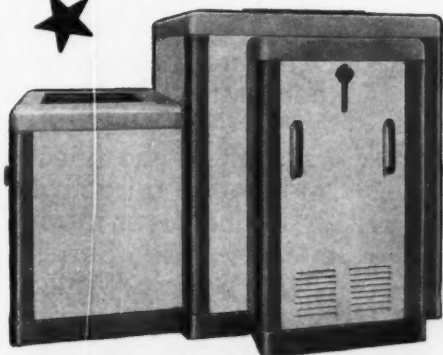
THE PEERLESS ELECTRIC COMPANY, WARREN, OHIO  
*"For 45 years—only the best"*

# Round Oak Scores Again

*with plus values for 1938*

It's profitable to line up with more satisfying Round Oak's complete line of cast and steel furnaces.

The enviable reputation and prestige of Round Oak products throughout the trade plus their unusual 1938 dealer proposition and valuable merchandising program spells more profit for you.



**Round Oak Oil Master**

A patented, scientifically designed heating unit built of extra heavy, copper alloy steel - all vital parts double arc-welded - permanently tight.



**The Round Oak "X-100"**

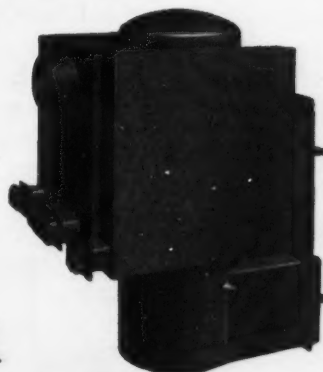
This unit includes a modern round cornered cabinet, heating unit, oil burner, precast combustion chamber, blower, filters and controls.

**Round Oak "SKX"**

A complete unit consisting of heater, conditioning unit, cabinet and automatic controls.

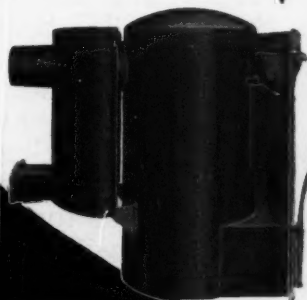
**The Moistair Boiler-Plate**

A furnace as built by Round Oak is the finest warm air furnace offered in this type, designed for small, medium and large homes.



**Round Oak Coal Master**

Featuring the exclusive patented clinker receptacle - a welded jointless constructed furnace - triple welded radiator.



**Moistair Blended-Iron "J"**

Heavily ribbed combustion chamber - two-piece firepot ribbed inside and out - made in sizes 20, 22, 24, 27, and 30.



Since  
1871

**Round Oak Company**  
Dowagiac, Michigan  
Stoves ... Ranges ... Furnaces ... Oil Burners  
Air Conditioning

Write for literature on the new Round Oak Line.

ROUND OAK COMPANY  
DOWAGIAC, MICHIGAN.

Send new literature on your complete line of steel and cast furnaces.

Firm Name.....

Street No.....

City..... State.....

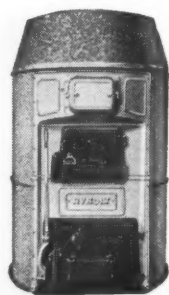
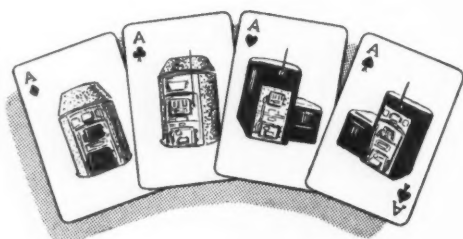
SC-OX

289  
13/5  
05  
113  
389  
21  
113  
289  
21  
210

# FOUR ACES

## for 1938

### AND EVERY ONE A WINNER FOR YOU!

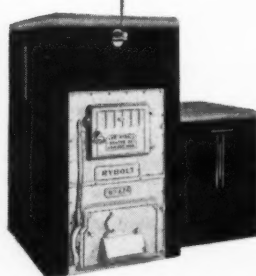


Here's your old friend . . . the famous five point Rybolt cast iron furnace. One of the few furnaces on the market that combines beauty, quality, efficiency, strength and price in one unit and is still priced low enough to appeal to **all** your prospects. You give a good tight job with a RYBOLT five point cast iron . . . one that will not constantly eat into your profits with return calls.

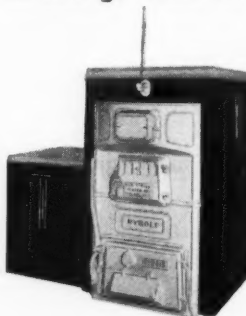


A worthy companion to the cast iron furnace is the new steel furnace that incorporates every advantage to be gained in warm air heating. Scientific design to produce more efficient heat and the famous Rybolt construction combine to make this furnace good for years of economical and trouble free heating.

Four aces generally mean the upper hand in any game and the heating and air conditioning game is no exception. With Rybolt dealing you four aces such as these, you don't have to gamble with an uncertain line during 1938. Rybolt Units are built of the finest materials, perform with surprising economy and make it easy to satisfy your toughest customer that he has made a good buy. You'll "deal" yourself in on a "rich pot" if you handle the Rybolt line.



Here are two up-to-the-minute Rybolt Winter Air Conditioning Units—the finest and most attractive Rybolt has ever introduced. The Series 600A7 Rybolt Winter Air Conditioning Unit shown at the left has as its heating element the new 600 Series Steel Rybolt furnace. Every advantage associated with warm air furnaces of the steel type, such as quick response to firing, ease of cleaning, and gas-tight construction, will be found at its best in this model. Also shown is the Series 157 Rybolt Winter Air Conditioning Unit, which has as its heating element the well-known Series 157 Rybolt Cast Iron furnace. This furnace combines with time-



tested Rybolt features all of the modern features of cast iron warm air furnaces. Salient points include slip-on fronts, surface ground ashpit and feed door joints, one-piece radiator, and Rybolt duplex ball bearing grate, all important factors of efficient, economical, and clean operation.

## THE RYBOLT HEATER COMPANY

ASHLAND OHIO



# Precalculated Engineering

There is urgent need today for some form of engineering calculation which will reduce the time required to estimate heat loss, establish cfm, determine register air temperature and duct sizes and, at the same time, be accurate enough for the average job. It seems logical that such a method can be based upon exposed wall areas with all calculations worked out beforehand and permanently filed in the form of precalculated tables. This series will discuss such a precalculated method.

By G. A. Voorhees

Consulting Engineer, Indianapolis

**P**RECISE engineering is impractical for the ordinary forced air heating system to be installed in the *average* residence of moderate size. The calculations required are not worth the hours they take.

Neither are elaborate calculations desirable for any *reasonably* accurate preliminary cost estimate on more complicated installations.

If the heat requirement of a room can be estimated in a few minutes with an error of 5 or 10 per cent, it's not worth spending 15 or 20 minutes *trying* to attain an accuracy within one or two per cent. In many cases it can't be done anyway.

For large and unusual installations, where accurate engineering is not only desirable but quite necessary, the new Technical Code for Mechanical Warm Air Heating is available, but for either preliminary estimates or complete design of smaller systems, a shorter method seems needed.

## Limitations of Rule of Thumb

Various "thumb rules" and "short cuts" are being used to save time. To some extent at least, they meet the demand for time saving but unfortunately, they often prove to be *too* inaccurate. It is believed that a workable compromise can be reached in providing a method which will keep the *ordinary* job from being "engineered to death" and at the same time will provide a more rational basis for preliminary estimates on more elaborate systems.

This can be accomplished by the use of precalculated tables which eliminate much figuring. Every step in a series of calculations offers just one more chance to

make a mistake in figuring. There is less liability of error in using such tables than there is in going through an unnecessarily long series of additions, subtractions, multiplications and divisions.

It is proposed in this series of articles to present a number of simple tables for estimating heat losses of rooms more accurately than is possible with most "short-cut methods."

Additional tables will be given for determining the volume of air (cfm) to be circulated to heat houses of various sizes at different register air temperatures and various numbers of air changes or recirculations per hour. A tabular method of quickly selecting the average register air temperature for any dwelling will be given.

Having determined this average register temperature, tables will be given to show (without unnecessary figuring) the corresponding register temperature for each room, depending on the length of warm air duct to that room.

Further tables will give duct and register sizes for rooms having various heat losses.

The author does not claim originality for these tables. They are adapted from methods which are being used by many successful dealers who specialize in forced air heating.

The accompanying table is the first of several which will appear in succeeding issues and which will give close approximations of the actual heat losses of rooms encountered in average residence construction. The heat loss is expressed in thousands of Btu per hour.

This Table No. 3 is for rooms having outside walls through which heat is transmitted from the room air to the outdoor air at the rate of *approximately* 0.25 Btu per square foot of area per hour per degree of inside-

TABLE 3

Heat Loss Through Gross Exposed Wall (Temp. Diff. 70 Deg.)				Heat Loss Through Gross Area Exposed Wall			
Running feet exposed wall		Ceiling height, feet		Running feet exposed wall		Ceiling height, feet	
8	9	8	9	8	9	8	9
4.....	0.6	0.6	0.7	37.....	5.2	5.8	6.5
5.....	0.7	0.8	0.9	38.....	5.3	6.0	6.7
6.....	0.8	0.9	1.1	39.....	5.5	6.1	6.8
7.....	1.0	1.1	1.2	40.....	5.6	6.3	7.0
8.....	1.1	1.3	1.4	41.....	5.7	6.5	7.2
9.....	1.3	1.4	1.6	42.....	5.9	6.6	7.4
10.....	1.4	1.6	1.8	43.....	6.0	6.8	7.5
11.....	1.5	1.7	1.9	44.....	6.2	6.9	7.7
12.....	1.7	1.9	2.1	45.....	6.3	7.1	7.9
13.....	1.8	2.0	2.3	46.....	6.4	7.2	8.1
14.....	2.0	2.2	2.5	47.....	6.6	7.4	8.2
15.....	2.1	2.4	2.6	48.....	6.7	7.6	8.4
16.....	2.2	2.5	2.8	49.....	6.9	7.7	8.6
17.....	2.4	2.7	3.0	50.....	7.0	7.9	8.8
18.....	2.5	2.8	3.2	51.....	7.1	8.0	8.9
19.....	2.7	3.0	3.3	52.....	7.3	8.2	9.1
20.....	2.8	3.2	3.5	53.....	7.4	8.3	9.3
21.....	2.9	3.3	3.7	54.....	7.6	8.5	9.5
22.....	3.1	3.5	3.9	55.....	7.7	8.7	9.6
23.....	3.2	3.6	4.0	56.....	7.8	8.8	9.8
24.....	3.4	3.8	4.2	57.....	8.0	9.0	10.0
25.....	3.5	3.9	4.4	58.....	8.1	9.1	10.2
26.....	3.6	4.1	4.6	59.....	8.3	9.3	10.3
27.....	3.8	4.3	4.7	60.....	8.4	9.5	10.5
28.....	3.9	4.4	4.9	61.....	8.5	9.6	10.7
29.....	4.1	4.6	5.1	62.....	8.7	9.8	10.9
30.....	4.2	4.7	5.3	63.....	8.8	9.9	11.0
31.....	4.3	4.9	5.4	64.....	9.0	10.1	11.2
32.....	4.5	5.0	5.6	65.....	9.1	10.2	11.4
33.....	4.6	5.2	5.8	66.....	9.2	10.4	11.6
34.....	4.8	5.4	6.0	67.....	9.4	10.6	11.7
35.....	4.9	5.5	6.1	68.....	9.5	10.7	11.9
36.....	5.0	5.7	6.3	69.....	9.7	10.9	12.1
				70.....	9.8	11.0	12.3
				71.....	9.9	11.2	12.4
				72.....	10.1	11.3	12.6

Type		Number of equivalent windows									
		1	2	3	4	5	6	7	8	9	10
Plain — no weather-strip, no storm sash		1.8	3.7	5.5	7.3	9.2	11.0	12.8	14.7	16.5	18.3
Weatherstrip only—no storm sash.....		1.5	3.1	4.6	6.1	7.7	9.2	10.7	12.3	13.8	15.3
Storm sash only—no weatherstrip .....		1.5	3.0	4.4	5.9	7.4	8.9	10.4	11.6	13.3	14.8
Both weatherstrip and storm sash .....		1.2	2.4	3.5	4.7	5.9	7.1	8.3	9.5	10.6	11.8

Add For Windows

outside temperature difference (heat transmission coefficient = 0.25).

These constructions are listed at the top of the table and it will be noted that they include walls having heat transmission coefficients ranging from 0.23 to 0.27. Since the table itself is calculated for a wall having the coefficient 0.25, the actual heat loss through the exposed wall may vary from the loss as given by the table by as much as 0.02 Btu per square foot per degree per hour, or 8 per cent. If the heat loss through the exposed wall is as much as half of the total heat loss of the room, the error reduces to 4 per cent of the total room requirement and if, as is more likely in the average house, the wall loss is only about one-third of the total, then the error becomes less than 3 per cent. For practical purposes, this should be sufficiently accurate.

In this, and in the other heat loss tables to be given in future issues, an inside-outside temperature difference of 70 degrees is assumed; 70-degree average room

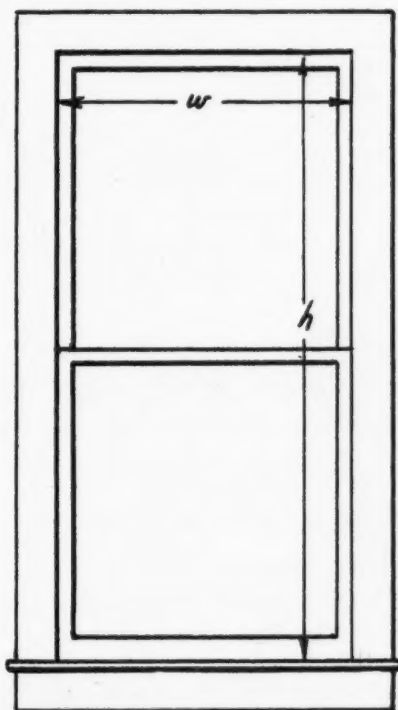
crack through which cold outside air can leak into the room (infiltration) is three times the width (top and bottom of sash and meeting rail) plus twice the height, or:

$$3w + 2h = (3 \times 2.5) + (2 \times 5) = 17.5 \text{ feet of crack.}$$

In calculating these tables, the "crackage method" of estimating infiltration as recommended in the A. S. H. V. E. Guide and in the new Technical Mechanical Heating Code, is used in preference to the more common "cubic content method" given in the Standard Gravity Code and the Tentative Mechanical Code because there is no logical relation between the cubic content of a room and the volume of outdoor air which will enter that room each hour by infiltration, while there is a very definite relation between the number of running feet of window and outside door crack and the volume of outside air which will seep in.

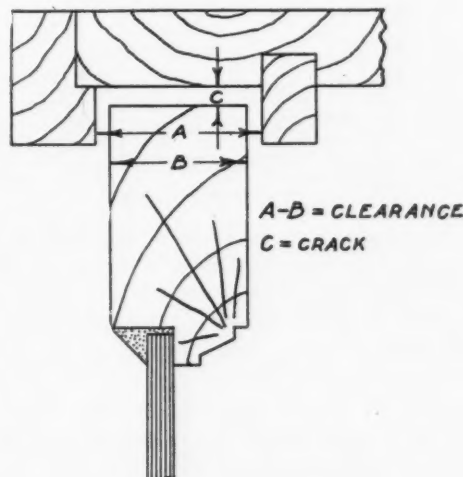
With a 15-mile wind, the volume of outdoor air which will be forced in through each running foot of crack (plus a reasonable added allowance for leakage around the window casing) is given by the American Society of Heating and Ventilating Engineers as 39.3 cubic feet per hour for the average window.

The Society defines the "average window" as one having  $\frac{1}{16}$ -inch crack and  $\frac{3}{4}$ -inch clearance. See Fig. 2.



At the left—Glass surface areas are measured as shown. Infiltration is determined on feet of crack according to the formula below the window.

At the right—Clearance and crack are sometimes confused. This drawing shows clearance as the spaces between the side of the sash and the frame track, while the crack is the space between the outside edges of the sash and the frame.



$$\text{AREA} = w \times h$$

$$\text{RUNNING FEET OF CRACK} = (3 \times w) + (2 \times h)$$

air temperature with zero and a 15-mile-per-hour wind outside. A conversion table is provided as will be explained later, so that the "standard" 70-degree tables can be quickly, easily and accurately applied in communities where the outside temperature used as a design basis may range from 20 degrees above zero to 30 degrees below. They will also enable the user to correct for room air temperatures other than 70 degrees such as bath rooms and sun rooms, where an 80-degree air temperature is desirable.

Windows are assumed to be double hung, wood sash with casement opening dimensions (Fig. 1),  $w$  (width) = 2.5 ft. and  $h$  (height) = 5 ft. The area of glass surface through which transmission loss takes place is, therefore,  $2.5 \times 5 = 12.5$  square feet.

With such a window, the number of running feet of

A "poorly fitted" window is defined as having  $\frac{3}{32}$ -inch crack and  $\frac{3}{4}$ -inch clearance and its leakage is 110.5 cubic feet of air per hour per foot of crack. Notice that an increase of only  $\frac{1}{32}$ -inch in width of crack and  $\frac{3}{4}$ -inch in clearance, steps up the infiltration per running foot of crack from 39.3 cubic feet to 110.5 cubic feet of air per hour—an increase of 180 per cent.

In new houses it is presumed that windows are well fitted, but normal shrinkage soon increases both crack and clearance width. In older buildings there are few windows which can be safely classified as "well fitted" or even "average." Hence, many careful engineers add from 15 to 25 per cent to the recommended 39.3 cubic feet per hour per foot of crack as a safety factor.

In making a heating survey of a building where an existing gravity circulating plant is to be converted to forced air heating or window air conditioning, the windows should be carefully inspected and when found to be loose, the owner's attention should be called to the unnecessary waste of heat. He should be urged to have



a competent carpenter tighten up all poorly fitted sash and if necessary caulk around the casings.

Since average conditions must be assumed in calculating tables such as are presented here, infiltration heat loss is based on an assumed leakage 20 per cent greater than that through an "average window"—47 cubic feet of air per running foot of crack per hour instead of 39.3.

With a leakage of 47 cubic feet of air per hour per foot of crack, the heat loss due to this infiltration will be:

$$47 \times 0.075 \times 0.24 \times 70 = 60 \text{ Btu per hour per foot of crack (approximately).}$$

in which

0.075 = Weight in lbs. of one cubic foot of air at room temperature of 70 deg.

0.24 = Btu required to raise the temperature of one pound of air one degree F.

70 = degrees difference between temperature of entering air and room air.

Since the number of running feet of crack in a double hung window is equal to  $(3 \times w) + (2 \times h)$  as shown in Fig. 1, and the rate of heat loss due to infiltration is 60 Btu per hour per foot of crack, it follows that the infiltration heat loss for each window is:

$$60 (3w + 2h)$$

$$\text{or } (60 \times 3 \times w) + (60 \times 2 \times h)$$

For the "standard" sized window 2 ft. 6 in. wide by 5 ft. high assumed in compiling the table, this becomes:

$$(60 \times 3 \times 2.5) + (60 \times 2 \times 5) = 450 + 600 = 1050 \text{ Btu per hour}$$

The transmission loss for single glass at the accepted rate of 1.13 Btu per degree temperature difference per hour per square foot of surface will be, for a 70-degree inside-outside temperature difference,  $70 \times 1.13 = 80$  Btu per hour per square foot of glass area (approx.).

The transmission heat loss for any window without storm sash would, therefore, be (Fig. 1)  $80 \times w \times h$ . For a window 2½-ft. wide by 5-ft. high, this becomes:  $80 \times w \times h = 80 \times 2.5 \times 5 = 1000$  Btu per hour.

#### How Glass is Calculated

The conventional method of calculating the transmission heat loss through the exposed walls of a room is to add together the transmission loss through the glass surface and through the net exposed wall surface. The net exposed wall surface is the gross area of exposed wall (running feet of exposed wall multiplied by ceiling height) minus the area of glass surface.

With tables such as are recommended here, the gross exposed wall area is used instead of net area, which eliminates one step in figuring and makes the estimation of heat losses quicker and more convenient.

This is accomplished in compiling the tables, by assigning to each standard size window, a heat loss equal to an equivalent area of wall or, stated another way, the leakage loss of the window plus the difference between the transmission loss through the window and through the same area of exposed wall.

Thus, for a wall having a heat transmission coefficient of 0.25 Btu per square foot per degree temperature

difference per hour (such as the accompanying Table No. 3) and assuming an outdoor temperature of zero with a room temperature of 70 degrees, the heat loss through 12.5 square feet of exposed wall will be:

$$12.5 \times 0.25 \times 70 = 218.75 \text{ Btu per hour.}$$

The heat transmission through this same area of glass surface as shown above, is 1000 Btu per hour. Therefore, the excess of transmission loss through the window over the transmission loss through the same area of exposed wall is:

$$1000 - 218.75 = 781.25 \text{ Btu. per hour.}$$

Hence, for each window, the transmission heat loss will be 781.25 Btu per hour greater than the transmission loss through the same area of exposed wall.

We must add to this excess transmission loss of 781.25 Btu per hour, the leakage loss of 1050 Btu per hour and the sum, 1831.25 Btu per hour, gives the additional heat loss to allow for each window not having storm sash or weatherstrip, in a room having an exposed wall with a coefficient of 0.25.

Allowance for window losses for rooms having outside walls with other transmission coefficients, tables of which will appear in succeeding issues, are determined in a similar manner by allowing for each window, the difference between the total window loss and the transmission loss through the same area of the particular wall construction covered by the table.

#### Effect of Storm Sash

For windows equipped with storm sash, the commonly used transmission coefficient has been 0.45 Btu per square foot per degree temperature difference per hour which is the value recommended by the American Society of Heating & Ventilating Engineers for double glazed windows.

But the storm sash usually found is the type which is put up in the fall and taken down in the spring and to facilitate this twice-a-year change, such sash is seldom tightly fitted. Consequently, a considerable volume of cold outdoor air seeps into the space between the window and the storm sash; the inner window pane is colder and the heat transmission loss from the room is consequently greater than would justify the use of a coefficient as low as 0.45.

The new Technical Code for Mechanical Heating therefore recommends that for windows equipped with such removable storm sash, a coefficient of 0.75 be used. This coefficient is the approximate mean between that for single glazed (1.13) and double glazed (0.45) windows as given in the A. S. H. V. E. Guide and since experience proves that it is a practical and safe value, it is used as the basis for heat loss through the windows equipped with storm sash in the accompanying tables.

For a window of the assumed size (12.5 square feet) and with this type of storm sash, the transmission loss will be:

$$12.5 \times 0.75 \times 70 = 656 \text{ Btu per hour.}$$

The total heat loss of the standard window with storm sash will be:

(Continued on page 152)

# A House Heated by Floor Plenums

OBTAINING greater winter time comfort in residences by keeping floors and outside walls warm is considered by many heating authorities as the next important advance in air conditioning. This method—known abroad as panel heating—is based upon the accepted principle that if floors and walls are warm there is little or no bodily radiation to cold surfaces, there will be a smaller temperature differential between floor and ceiling and comfort is obtained at lower breathing level temperatures.

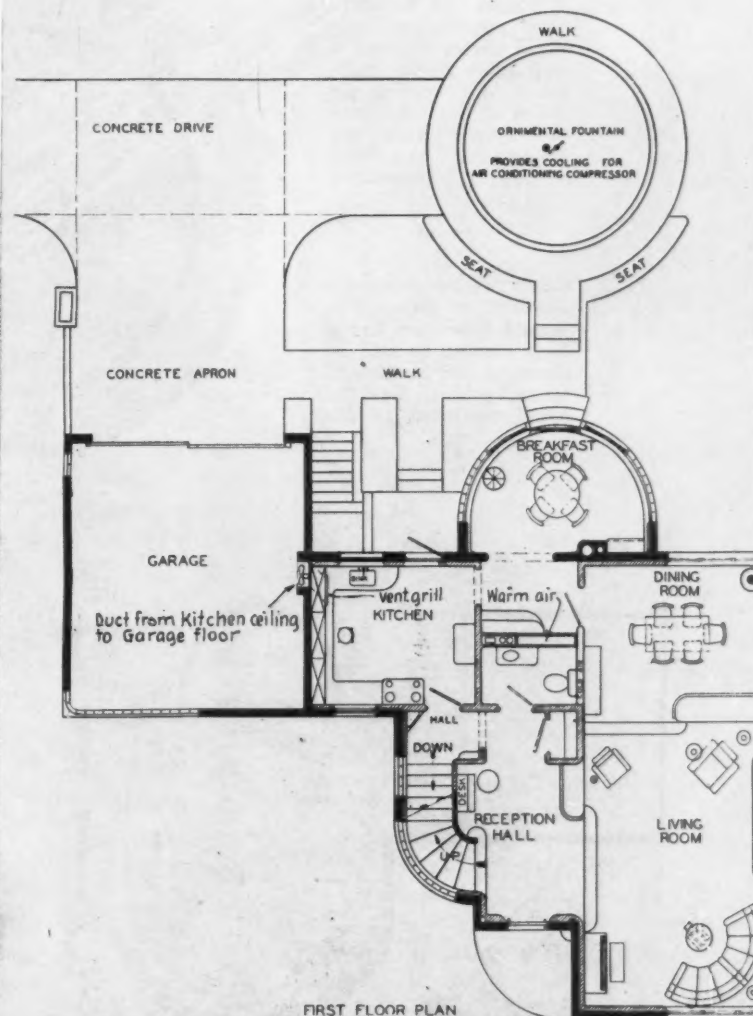
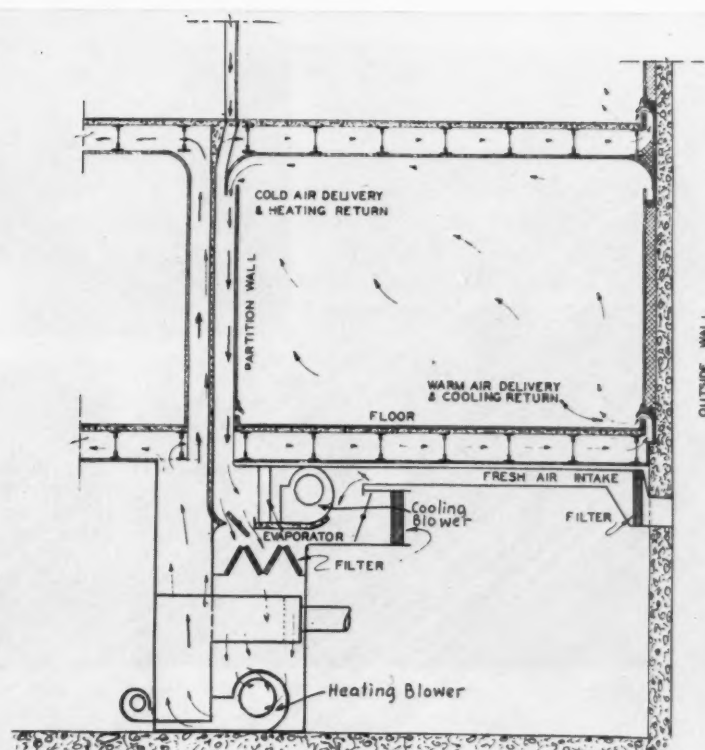
A number of installations of this general type have been designed with, so far as we can find, complete satisfaction for the owner. A very interesting example of this type of installation was completed this past summer in St. Louis in the new home of L. M. Pearsons, chief engineer of the White-Rodgers Electric Company, manufacturers of automatic control equipment.

## Construction of House

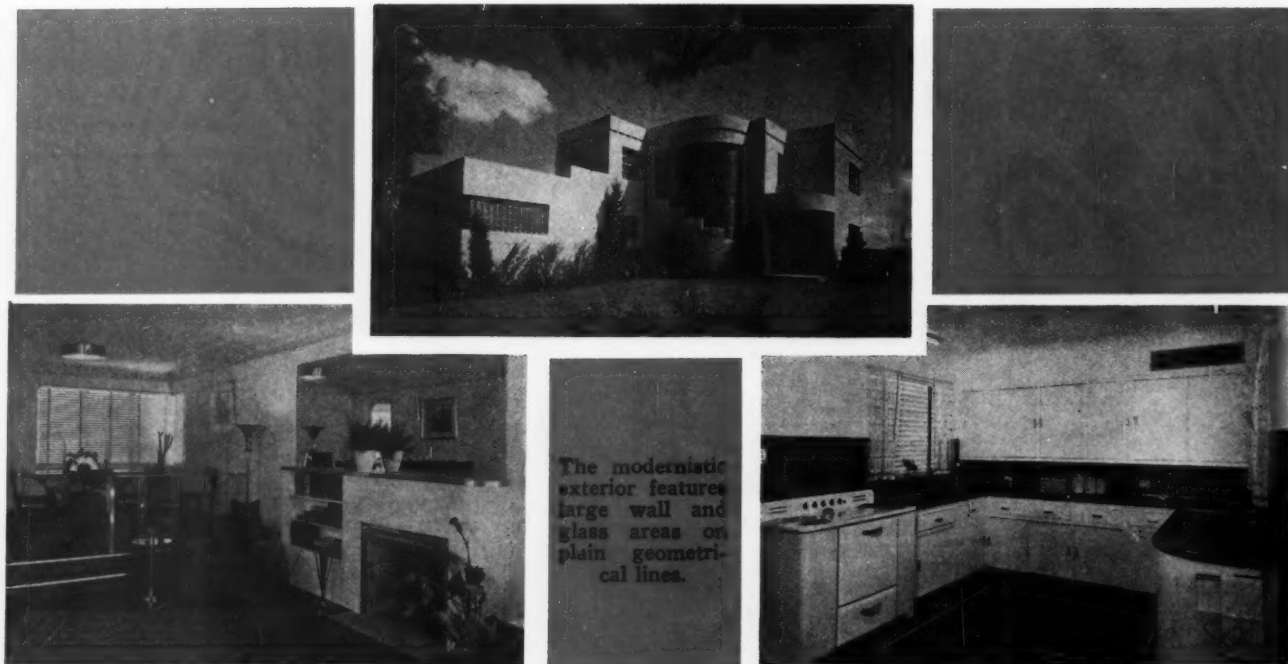
The house is an interesting example of modern design and construction. Concrete construction throughout, with generous areas of glass brick, unusual indirect lighting systems and ultra-modern appointments combine to make this home a "show-place" for prospective home owners and the local building trades. The use of plastic material (concrete) results in an unusual architectural beauty, and the best tribute to the whole project is the building of several new homes of similar design and construction on which work has already begun.

The home was built with the idea of creating conditions and problems with which the heating and air conditioning industry will be faced when this trend toward the use of more modern building materials becomes more pronounced. Further, it provided the White-Rodgers Electric Company opportunity to develop the needed control equipment in advance of the market requirements.

Mr. Pearsons says the air conditioning system installed in his home is designed on the theory that the comfort of almost every person is principally governed by the temperature and humidity around the feet and legs. If the lower parts of the body are comfortable, a person feels comfortable at any reasonable inside temperature and frequently at a lower temperature than is commonly thought necessary. He has used this idea before in the auto-

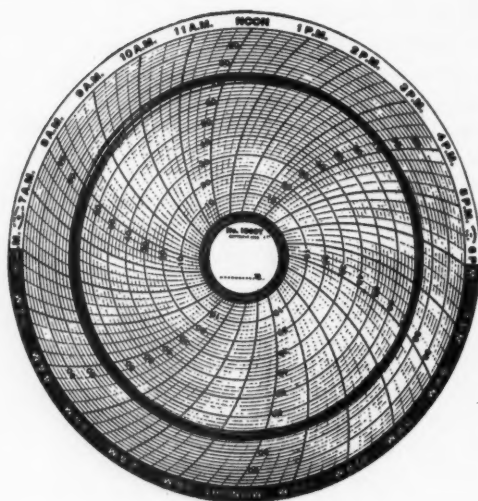


The first floor plan shows arrangement of rooms and outdoor pool used for cooling compressor water. The top detail shows warm air risers and floor plenums, the two blowers, supply and return slots and basic principle of the system.



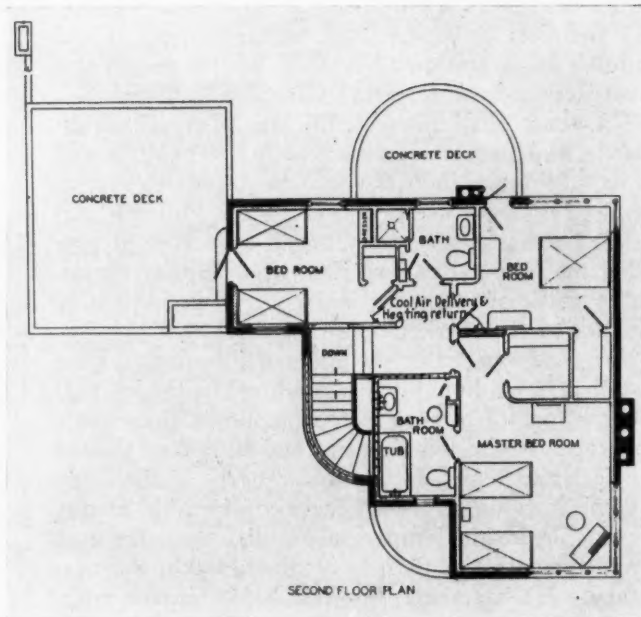
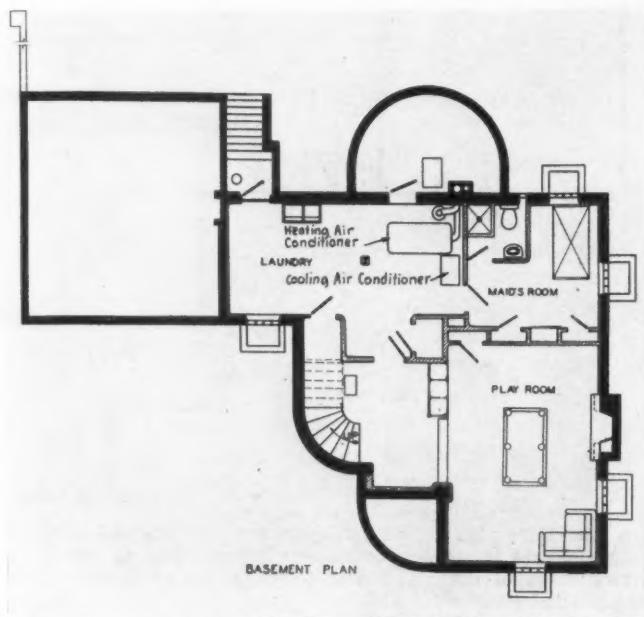
The living room, above, is heated by a warm floor plenum and air which enters through a long grille in the baseboard. For cooling, air leaves at the baseboard and enters from the ceiling cove. The detail on page 113 shows the general plan.

Below are basement and second floor plans. The second floor also has a floor plenum as well as the cove and baseboard slotted grilles. See the detail elevation for design.



The grille in the kitchen wall connects to a separate exhaust system. Warm air enters from baseboard grilles.

The temperature chart at the left was obtained by operating the system manually. Under automatic control, changes were so gradual, due to the warm mass of concrete, that the recorder failed to show any abrupt changes.





matic heating industry when designing controls to eliminate "cold 70."

The floors of the house are not solid concrete, but are built of open web, 10-inch steel joists, to permit using the floors for plenum chambers. The bottom of each floor is sealed off with concrete, forming the ceiling surface for the rooms below, and the top of each floor is sealed with a single 3-inch concrete slab, laid over the joists and forming the floor surfaces. Both floors, throughout the home are covered with one-eighth-inch mastic tile.

Thus with the floors providing the plenum chambers, the conditioned air is delivered from the top of the unit, through a large duct (much like a pipe-less furnace) directly into the first floor plenum. A large riser, 10 inches wide and 4 feet long, equipped with a splitter damper to regulate the



Rear of the house with the fountain used to cool compressor water in the foreground.

volume of air, is built into a partition wall and provides for air delivery from the first floor chamber to the second floor chamber.

#### Winter Operation and Results

In winter the heated air is delivered into the rooms through slots in the wall and located 6 inches above the floor level. These slots are 1 inch wide by 15 feet long and are curved to deflect the air down toward the floor (see cross section). The large area of these slots admits the incoming air at such a low velocity that air movement is imperceptible. Slots are adjustable for air balance.

Return air outlets are provided in a "cove" or gutter-like depression in the walls, near the ceiling and at a point about where picture molding would ordinarily be located. The concealed lighting equipment is contained in this same "cove" and the return air openings are just as effectively concealed as the lighting equipment.

The floors of the house contain 40 tons of con-

crete. On a zero day outside, floor temperature will reach 80° to 85°. Incoming air will be around 75°. Ceiling temperatures run around 70°. Due to the large bulk of concrete in the floors it is necessary to operate the heating unit about 24 hours from a cold start to bring up floor temperatures to the comfort point for occupants of the room. However, this condition never exists in actual practice, as a home of this type is always maintained at nearly constant temperature and humidity the year 'round, with a minimum of 70° during the heating period, and a maximum of 80° during the cooling period.

The results of tests with automatic controls show no variation from the control temperature, or charts with perfect circle records. Therefore, in order to give a good idea of the problems involved, records were made with manual control and the results shown on the accompanying chart. With the heating and cooling plant operating for periods of several hours at a time, a variation from the desired temperature of only a degree or so is all that was recorded. This is due to the stabilizing effect of the enormous amount of material in the floors which are heated and cooled before a noticeable change of temperature in the room occurs.

#### The Cooling System

Summer cooling equipment in the Pearsons' home employs a three ton refrigeration unit. The direction of air flow is reversed through the system in summer, bringing the cool air in at the top of the room and letting it settle to the outlets at the bottom. The heat from the compressor is dissipated through a spray pond in an outdoor fountain and pond.

Total heat loss for this building is only 100,000 Btu., due largely to its unique construction. The heating unit is gas fired with a capacity of 125,000 Btu. The heating blower is rated 1,300 cfm. Concrete slabs that form the floors do not extend to the outside walls, but stop 4 inches from them. This prevents heat loss by conduction, and allows for expansion of the floors. Steel joists, of course, attach to the wall, but the heat loss through them is comparatively small. Humidity is supplied by a pan-type humidifier in the heating unit.

The living room ceiling is 9 feet, but all other rooms are 8 feet. The house is insulated with 4 inches of rock wool in the side walls and 6 inches in the roof. The wall insulation is behind 2 by 4 furring studs which support the plaster. Where ducts come up outside walls the insulation is thinned to admit a 2-inch duct. Above the layer of insulation in the roof is an air space which is vented to the outside by about 300 holes of 3-inch diameter in the side walls. These permit roof heat to be carried off in the summer and lower temperatures in the attic space.

Summing up his theories on comfort, Mr. Pearsons says, "We must learn to condition the lower part of our rooms and take off the warmed air as it rises to the ceiling," and certainly he has put his theories into actual practice very effectively in his new home.

# Condensation of Moisture

By L. V. Teesdale

Senior Engineer, Forest Products Laboratory, Forest Service, U. S. Dept. of Agriculture

**C**ONDENSATION or moisture accumulation within walls and in attics or roof spaces has become a subject of considerable concern to many home owners and prospective builders, especially in the states north of the Ohio River.

Obviously the question arises as to why we hear so much more about this condition now than we used to just a few years ago. The answer is relatively simple. During the last few years there has been a marked tendency on the part of the architects, builders, and home owners to improve homes both new and old with the idea of increasing the comfort of the occupants and decreasing operating expenses. Prominent among these improvements are the increasing use of storm sash, insulation, weather strips, calking around windows and doors, and other means of decreasing heat loss and wind infiltration.

## Effect of Higher Humidities

Because of the tighter construction the normal humidity or vapor pressure within a house so constructed is higher than in houses less tightly constructed. In addition, as a health and comfort measure the normal humidity is usually augmented by evaporating water or some other means of winter air conditioning. Improvements that add to

comfort and health are worth while and should not be discouraged, but it so happens that they introduce the unanticipated moisture problem just described.

Because of the present trend to higher indoor relative humidities and, therefore, higher water vapor pressure within doors, there will be a constant out leakage of water vapor, the amount depending upon the tightness of windows and doors, the permeability of the wall materials, and upon other factors. If doors and windows are loose, water vapor will pass out readily and if tight the leakage will be minimized.

The effect of the humidity or vapor pressure on condensation can be understood by examining Figs. 1 and 2. Fig. 1 illustrates a typical frame wall of lath and plaster, studs, sheathing, sheathing paper, and wood siding. Fig. 2 illustrates a wall similar in all respects except that the stud space is filled with insulation.

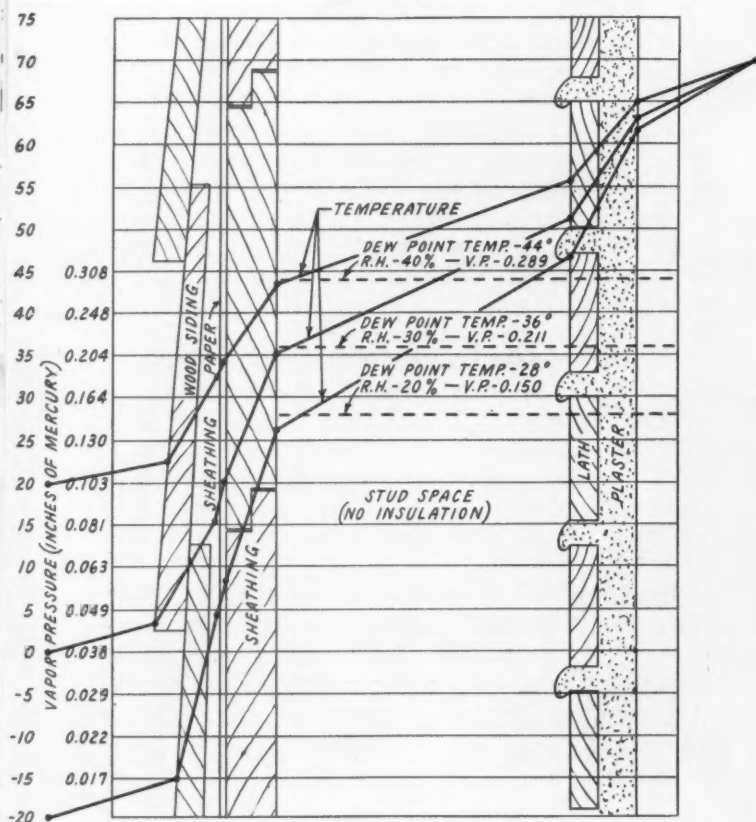
## Effect of Vapor Pressure

For purposes of illustration the following examples have been chosen: One indoor temperature of 70° F.; three outdoor temperatures of 20° F., 0° F., and -20° F.; and three indoor relative humidities of 40 per cent, 30 per cent, and 20 per cent. When the temperature of the room side of the sheathing is above the dewpoint temperature in the room, no condensation can take place within the stud space. When, however, the sheathing temperature falls below the room dewpoint a different set of conditions prevails.

If, in Fig. 1, the lath and plaster offered no resistance to the passage of vapor, condensation could take place on the sheathing with the latter exactly at the room dewpoint. The amount of condensation would be limited only by the ability of the sheathing to function as a condenser and the permeability of the sheathing to water vapor. Since the lath and plaster do offer some resistance to the passage of vapor, the vapor pressure within the stud space will be less than that within the room whenever there is vapor movement through the lath and plaster. Actually, therefore, condensation cannot take place within the stud space until the sheathing temperature is appreciably less than the room dewpoint.

When condensation is actually taking place on the sheathing, the vapor pressure within the stud space will be largely determined by the sheathing temperature and will, in general, correspond rather closely to saturation pressure at this temperature.

Fig. 1.



# In Walls and Attics

The three jagged lines marked "temperature" show the temperature gradients from one side of the wall to the other for the three chosen conditions. The three dashed horizontal lines marked "dewpoint temperature" serve to locate the dewpoint temperatures for the foregoing three indoor relative humidities. The water vapor pressures corresponding to these dewpoints are also marked on the respective lines.

## Temperature Drop in Walls

Comparing Figs. 1 and 2, it is at once evident that, within the stud space, the temperature gradients are much steeper in Fig. 2 than in Fig. 1, and that the respective sheathing temperatures are much lower in Fig. 2 than in Fig. 1. This results from the addition of insulation in Fig. 2. Because of the lower sheathing temperatures condensation will occur on the sheathing with lower room humidities when insulation is used than when it is not used. Conditions within the walls are actually more complicated than the drawings and examples indicate, because they are not static, and matters of heat balance and rates of water vapor movement and air movement have important effects upon what goes on.

Referring again to Fig. 1: When the relative humidity within the house is 40 per cent, the vapor pressure is approximately 0.289 of an inch. The temperature gradient through the wall when the outside temperature is 20° below zero intersects the room side of the sheathing at about 26° above zero and, assuming saturated air at this point, the vapor pressure there will be only about 0.137 of an inch. This difference in vapor pressure will cause vapor to move from the room through the plaster to the stud space and condensation will develop in this space.

## Effect of Fill Insulation

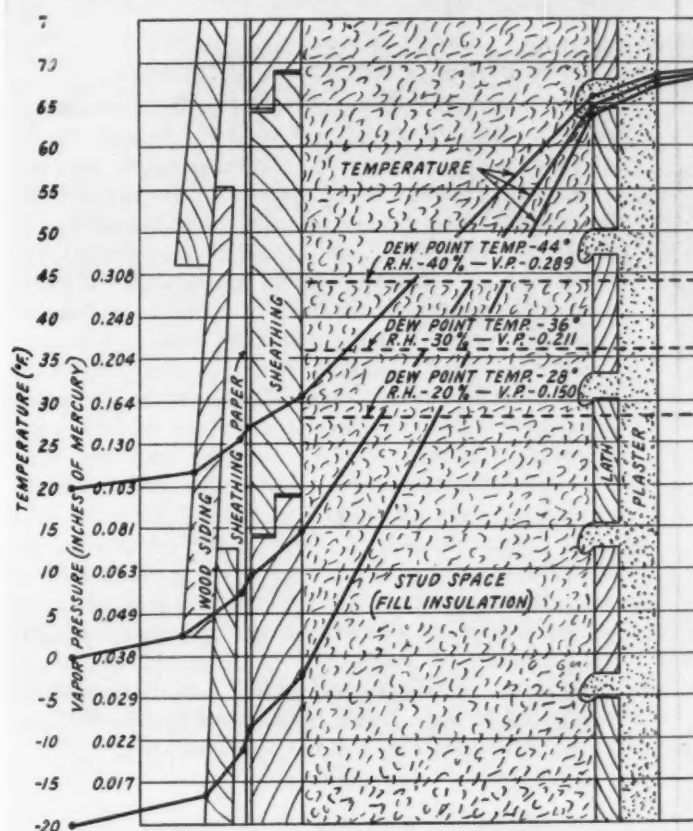
This condensation will eventually appear as frost or ice on the sheathing, which is below the freezing point. The still lower temperature and vapor pressure on the inner face of the sheathing paper will cause some of the remaining moisture vapor to move from the inside face of the sheathing to the colder face of the paper, but as the resistance to such movement is greater through the sheathing than through the open stud space the rate of vapor movement will be correspondingly small. However, with a rise in outside temperature the ice may melt and some water may be absorbed by the sheathing. Some may even run down inside the wall.

The better grades of sheathing paper commonly used are very vapor resistant and very little vapor will pass through, but with changing outdoor temperatures when cold weather is followed by mild temperature, the ice that forms between the sheathing and the paper may melt behind the paper, run down to a horizontal joint where some may work through and wet the siding. This is one source of moisture that may contribute to paint failures.

## Formation of Frost and Ice

The same general principle of vapor movement exists where fill insulation is used. The insulation itself is not resistant to vapor movement and the bulk of the condensation appears on the inside face of the sheathing. However, in the insulated wall the resistance to heat loss offered by the insulation results in a much lower temperature at the sheathing line, consequently the sheathing is below the dewpoint temperature at much higher outside temperatures than is the case in uninsulated walls. This fact, in turn, very greatly increases the amount of condensation that may collect, since periods of extremely cold weather, such as are required to cause condensation in uninsulated walls, are of relatively short duration but there may be a total of

Fig. 2.





several weeks during the winter when the outside temperature is low enough to cause condensation in insulated walls.

There are a number of types and kinds of insulation on the market and the potential buyer often hears that certain types "draw water" and become wet. This is not true. Such insulation, because of its efficiency in reducing heat loss, lowers the temperatures within the wall and thus sets up the condition that increases the amount of moisture that may accumulate. Once understanding the conditions that cause the moisture it is also possible to provide means of prevention as discussed later.

#### The Problem of Attics

The conditions that cause condensation in side walls also occur in attics or under roofs, modified more or less by any ventilation that may be provided or that may occur naturally. Roof condensation is reported far more frequently than side wall condensation, not necessarily because it occurs more frequently, but rather because it is more likely to be seen by the occupants. For example, in a pitched roof house having, say, fill insulation in the ceiling below the attic, condensation may develop during a severe cold spell on the under side of the roof boards, forming as ice or frost. When the weather moderates, or even under a bright sun, the ice melts and drips on the attic floor, leaks through and spots the ceiling below. Often such spots are assumed to be roof leaks and cause owners and contractors considerable unnecessary expense in attempting to waterproof a roof that is not leaking. If the attic has adequate ventilation little or no trouble will occur, but adequate ventilation is sometimes difficult to attain, and tends to increase the heat loss.

#### How Vapor Moves

The movement of water vapor is independent of air movement to the degree that no general circulation of air is necessary to carry the vapor into the wall. The vapor actually moves by diffusion from zones of higher vapor pressure to zones of lower vapor pressure. In fact plaster is very highly resistant to air infiltration even when under a pressure equivalent to a wind velocity of 15 miles per hour but no such pressure exists within a house. Vapor, however, will move very readily through plain plaster but is retarded somewhat by paint coatings and other surface treatments. Other types of wall surfacing materials, such as plywood, fiber boards, and plaster boards are also permeable to vapor and here again the surface decorating material has more or less effect on the resistance. In the case of plywood the type of glue used is also a factor, the phenolic resin glues being much more resistant than soy bean and casein glues to the passage of vapor.

Moisture accumulation within a wall like those illustrated in Figs. 1 and 2 is affected by five factors:

1. Outside temperature and humidity.

2. Efficiency of insulation.

3. Inside atmosphere (temperature and humidity).

4. Resistance of outer wall to vapor movement.

5. Resistance of inside wall to vapor movement.

As the outside temperature and humidity cannot be controlled and as insulation adds to comfort, health, and fuel economy, methods of prevention are limited to the three other factors. Some authorities believe that indoor humidities low enough to preclude the possibility of moisture accumulation are undesirable both as a factor of health and comfort and in preventing the overdrying of interior woodwork and furniture.

It is possible, of course, to compromise and carry somewhat lower humidities during very cold weather than are maintained during moderate winter weather and thus reduce the amount of moisture that would accumulate as condensation. It is also possible to so construct walls that the vapor could pass outward through sheathing and sheathing paper and escape through openings in the outside wall covering or be carried away by ventilating the space between the sheathing and outside finish. Standard construction does not lend itself to this method of moisture elimination. Either the inclusion of ventilating holes in the side wall material or a ventilating space would require more or less modification of the conventional construction.



#### Siding Ventilation

One possible method for wood siding would be to place 1 by 2 inch furring strips over the sheathing, thus obtaining a vertical ventilating space approximately of  $\frac{3}{4}$  of an inch which should be open to the outside at both the bottom and top of the wall so that air could enter at the bottom and pass out at the top. The openings could be concealed behind but not covered by mouldings or other treatment at the water table and cornice. Similar ventilation could be adapted to stucco, brick, and stone exteriors.

With this method the sheathing paper should be of a type that passes water vapor readily, such as slaters felt. During periods of protracted cold weather it is quite possible that moisture would accumulate in the wall faster than it could pass through and be removed by ventilation, hence the ventilation method might not assure complete protection. So far, the possibilities in this method have not been thoroughly investigated by the Forest Products Laboratory.

Attics under pitched roofs can often be ventilated either through windows or louvered openings ventilators in the roof, or openings in chimneys. Wood shingle roofs, when laid on roof boards that are separated about 2 inches, will often allow enough ventilation in the attic to eliminate the moisture problem. Flat roofs are more of a problem. Where the ceiling joists or supports and roof joists or supports are separated enough to allow a free circulation of air, and where sufficient openings and vents

are installed a fair degree of ventilation can be obtained. Often the space under flat roofs is not sufficient to obtain adequate circulation.

The most positive, and least expensive, method of control so far experimented with at the Forest Products Laboratory is the use of vapor resistant barriers at or near the inner face of the wall and under ceiling joists under the attic. In houses under construction this barrier can be attached to the inner face of the studs after the walls have been insulated and before lathing or finishing the wall on the inside. In houses already plastered the barrier can be some suitable material or treatment applied to the interior surface of exterior walls. While it might appear on first thought that such a barrier should be 100 per cent resistant, actually, however, it is not practical to obtain 100 per cent efficiency. With a suitable barrier, however, the amount of moisture entering the wall is so small that it will not raise the moisture content to a degree that is objectionable.

#### Vapor Barriers

The Forest Products Laboratory has been making tests on the vapor resistance of various materials used in wall construction and also on many materials that might be used for moisture barriers. Although these tests are still under way and have not covered all possible materials, enough information is available to permit the selection of a number of materials that are highly resistant to the passage of water vapor.

Among these are (1) asphalt impregnated and surface coated sheathing paper, glossy surfaced, weighing 35 to 50 pounds per roll of 500 square feet; (2) laminated sheathing paper made of two or more sheets of kraft paper cemented together with asphalt; (3) double-faced reflective insulation mounted on paper.

The water-vapor resistances of these three materials, as measured at the Laboratory differ considerably one from another. Unfortunately, the work has not progressed far enough yet to enable a definite statement of the precise degree of vapor-resistance required for any specific set of conditions. Most of the discussions and recommendations in this preliminary article are based upon a climate such as that of Madison, Wis., and upon plastered wood construction. The recommendations have not yet been subjected to actual service tests, and may have to be modified as time goes on.

The barrier when located as described on the warm side of the dewpoint position resists the passage of moisture while it is in the form of vapor and therefore before it has a chance to condense into water. Hence there is no hazard of water forming behind the plaster or other interior wall finish. The barrier also prevents moisture from getting into the wall or attic space during the construction period, particularly during the plastering operation.

Such vapor barriers should be applied vertically on side walls with edges lapping on the studs after the insulation is installed and before lathing. Horizontal joints should be made only where backed up

with a plate or header. The barrier should be brought up tight against electric fixture outlets, air registers, door and window frames, and other similar openings. If wood lath, metal lath, or other types requiring a plaster key are used, the paper should be applied slightly loose so that the plaster can push the barrier back to form the key. Where the ceilings below the attic or roof are insulated the barrier should be applied in a similar manner.

Walls finished with such materials as plywood, fiber board, plaster board, and the like should also have the barrier as described. Sheathing paper when used outside of the sheathing in combination with the moisture barriers described should be water-resistant but not very vapor-resistant so that the small amount of water vapor that may leak through the barrier can escape outward. Slaters felt meets this requirement. Quite possibly the sheathing paper could be omitted entirely; and it is conceivable that the omission would actually result in a drier wall. Further experiments will have to be made before this point can be definitely settled.

Some kinds of mineral wool are relatively resistant to water absorption, others are treated to make them resistant to wetting by water. This property, while desirable, does not make these materials resistant to the passage of vapor. Therefore they should not be considered a source of protection against condensation.

#### Paper Backed Wool

Some types of mineral wool have a vapor-resistant paper back attached to the batt. Tests to date indicate that none of these papers has a vapor resistance equal that of the 50-pound sheathing paper previously mentioned. They are sufficiently resistant, however, to be of definite help in keeping the insulation and the wall dry and to warrant proper care in installation.

The wool batt is made to fit between standard stud, joist, and rafter spacing with tabs on the paper which extends out from the batt and are tacked to the studs or rafters. The batt may be cut or forced back to obtain the tabs at the end of the batt. Where the spaces are not standard between studs, such as occurs around windows, doors, and dormers, particular care should be taken to obtain good joints even if it is necessary to use one of the barriers previously described.

Blanket types of insulation are also available where the insulation is enclosed within a heavy paper covering treated with asphalt. This paper covering is a fairly effective vapor barrier, but not so effective as the 50-pound sheathing paper. It is important that this type of insulation be carefully installed so that vapor cannot work through around the edges. The tabs should be nailed to the face of the studs with the insulation looping loosely inward away from the inner face of the wall or if installed between studs it should be fastened in place with wood strips.

Fiber board sheathing is often used as a substitute

(Continued on Page 156)

What is

# This Thing Called Humidity?

By Lorin G. Miller,

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THE majority of interested individuals would reply to the question what is humidity, with a form of the casual statement "It is the amount of moisture in the air" or "The quantity of water in the atmosphere." These impressions cannot be condemned as erroneous, but may be criticized as being inadequate and such statements may lead to conclusions that are not supported by real fact.

For a clearer understanding of the question of humidity, it seems best to first take a look at those terms we use so glibly as "air," "atmosphere," "vapor" and "moisture." "Air," in common parlance, refers to those elements and compounds filling the space surrounding us, which nature keeps in nearly constant proportion. Hydrogen and Oxygen comprise the major amount, but Argon and Carbon Dioxide appear in measurable quantities and some other materials are present as traces. When using the term "atmosphere," we choose to designate that space filled with constant quality air, but also encompassing certain other materials variously described as "dust," "odors," "gases," "pollen" and "vapors," as well as other visible or invisible particles which may be injected into the space by local or unusual causes.

## Vapor and Moisture

Vapor and moisture are terms often used synonymously and taken to mean an amount of water existing in some form or other in air spaces or attached to surfaces of materials in question. While it is the water vapor we are directly interested in, the essential differences between water and water vapor should be kept in mind. Water is dense; water vapor light; water is visible, vapor invisible; water remains practically the same volume at all pressures while vapor volumes may vary widely with pressure and temperatures, but most important of all to the designer of air conditioning systems is the fact that water contains much less heat than vapor at equal conditions of temperature and pressure. Water cannot be changed to vapor without addition of heat and conversely vapor cannot be condensed into water without the removal of heat.

These changes of state from the solid ice to fluid water and from fluid to vapor are not simple, so some reference to the elementary structure and energy of the material at this point may prepare the way for the facts to follow. Water is made up

of two parts of hydrogen and one part of oxygen in chemical combination. These water particles or molecules remain the same chemically in all three states, vapor, water and ice. They act like spheres and may be considered such with sufficient accuracy to satisfy this discussion.

These spheres at all usable temperatures are in a state of continual thermal agitation, that is of vibration and collision, due to the energy or heat contained. Ice molecules at 32F. travel nearly half a mile per second and hit the adjacent molecules about ten thousand times per second. While in solid state

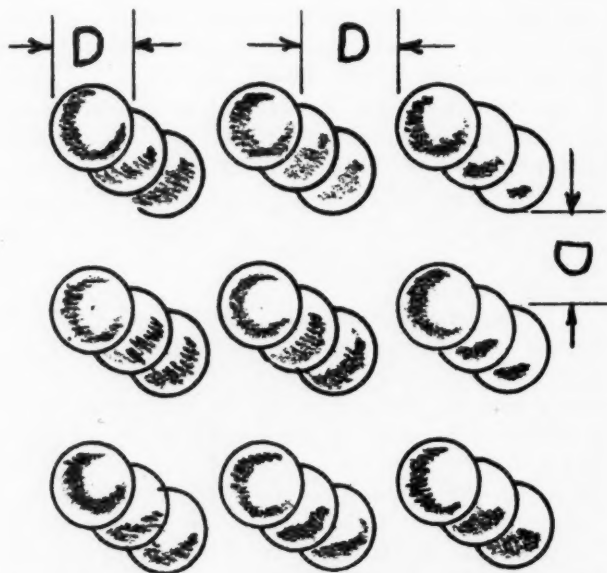


Fig. 1—Showing arrangement of particles in a solid such as ice. Note that the spacing of perimeters is about equal to the diameter of the spherical particles.

the position of the particles relative to one another probably does not change, the cohesive and adhesive forces being so strong that they remain to vibrate in fixed orbits. In such a state the material is rigid and opposes any change of form. Fig. 1 shows an orderly arrangement of particles and emphasizes the fact that even a solid is not "solid," that is the particles themselves are not in contact except as they collide, but a considerable amount of unoccupied space is included even in such dense material as ice, where the distance between molecules is approximately equal to the diameters of the molecules them-



January, 1938

selves. These spaces between particles are found in all homogeneous solids and the voids are decidedly more pronounced in materials not homogeneous.

When heat is added to a solid, such as ice, its temperature rises. This increase in sensible heat is merely tangible evidence of an increase in the energy content and hence in the thermal agitation of the particles. As an illustration, consider a piece of

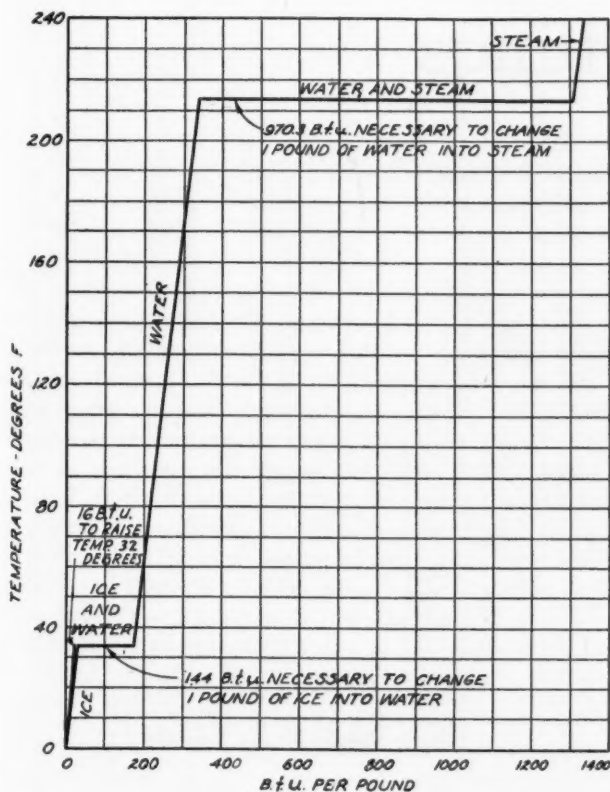


Fig. 3—Changes in state of ice to water to vapor charted to show relative length of each stage as heat is applied and amount of heat required to bring about each change in state.

ice taken from a condition of zero Fahrenheit. If the ice has been in this place for any length of time, its temperature will also be 0F.

When placed in warmer surroundings, it will absorb heat and each .5 Btu. will raise the temperature of one pound one degree. Naturally the outside surface will become warmer and heat will be transferred to the inside. The conductivity of ice is about the same as concrete so that when the outside surface has reached 32F and begun to melt, heat is flowing toward a point one foot inside the surface at a rate of about four Btu. per square foot per hour.

When this condition of agitation becomes sufficiently active, it overcomes the forces of cohesion and adhesion and a change of state occurs. It may become more, or less dense, but often there is little or no change in density. The properties of strength, hardness and elasticity give way to viscosity. The particles no longer maintain the same relative position, but migrate under minute forces such as gravity. The most important fact to be remembered is that at this point without change in temperature, a definite amount of heat is absorbed. These changes

are illustrated in Fig. 3. In the case of ice to water 144 Btu. per pound are required.

If heat is added to the substance after it has melted, the temperature will rise without other properties being noticeably affected. Considering the particles themselves, they are vibrating with increased rapidity but in practically the same orbit since the density changes but little. This condition of transition will obtain until the temperature reaches a certain relationship to the pressure. Fig. 3 gives that relation for water. When this pressure temperature ratio is reached, and heat is continuously added, the performance undergoes a decided change. The temperature ceases to rise and the material changes from fluid to vapor. At atmospheric pressure this occurs with water at 212F. (Dotted line Fig. 4.)

At atmospheric pressure the change in volume from fluid to gas is from .0167 cu. ft. per pound to 26.8 cu. ft. per pound, an increase in volume of 1600 times or an increase in dimension between particles of 12 times. Where the distance between surfaces of the particles in solid and liquid form was about the same as the diameter of the particle, it now becomes some twelve or more times as great. The comparison between Figs. 1 and 2 illustrates this change. In most cases the vapor is invisible. The

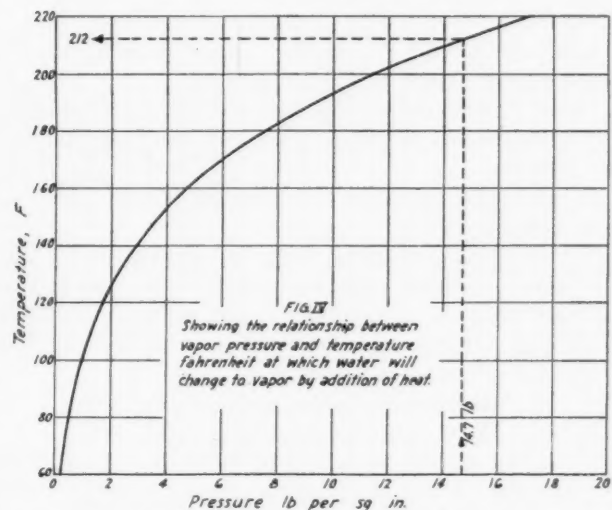


Fig. 4—Showing pressures at which water changes to steam. Readers who have heard that water boils at lower temperatures on mountain tops can verify that belief with this chart. Barometric pressures decrease with increasing altitude.

collisions are no longer regular, but occur in a heterogeneous manner. It has been, and can be shown, that the average velocities of these particles is the same in all directions. It requires, in round numbers, 1000 Btu. to accomplish this change of state. (Actually 970.7, see Fig. 3.) At the point where the liquid has just turned to vapor, it is described as saturated.

Continual addition of heat to a vapor after the liquid has all been vaporized will again raise the temperature and also increase the volume occupied by a unit of the vapor. This condition is described

(Continued on page 158)

## Forced Air Heating Facts From the Research Residence—

# Friction Pressure Loss Through Duct Fittings

By S. Konzo

Special Research Assistant Professor  
Engineering Experiment Station  
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**A**AVAILABLE data on the friction pressure loss through duct fittings and connections are rather meager, considering the relative importance of such data in duct design. In addition, the data published are not all consistent with each other. The infinite variations possible in the shapes and sizes of duct fittings, together with the difficulties inherent in all measurement of pressure losses, make this subject one of the most promising fields of investigation.

A great deal of the apparent inconsistency in the results obtained by various investigators may be due to variations in such factors as:

- a. Differences in velocity contour, or velocity gradient, in the air stream approaching the test section.
- b. Differences in smoothness of wall and joint sections.
- c. Differences in the test section used. As shown by Busey and also by Madison and Parker the addition of a straight pipe to the outlet side of an elbow tended to reduce the friction loss rather than to increase it.
- d. Differences in the air velocities used.
- e. Differences in the aspect ratio used.  
(The aspect ratio is the ratio of the width of the duct to the depth of the duct.)
- f. Differences in air density and in refinements in the technique of air measurement.

### Source of Data Used

The values shown in this article, which have been assembled from a great many different sources, must be regarded, therefore, as *good* approximations. However, they do indicate the magnitude of the losses imposed and should be of some value in the design of duct systems where pressure losses are a major item to be considered. In order to condense the material, the different cases have been arranged in graphical form as shown in Figs. 1 to 6 inclusive. The cases under consideration are indicated on the left-hand side of each figure. The pressure loss, which consists of losses due to internal friction of the fluid and the losses due to the friction of the fluid in contact with the surrounding

walls, is expressed in terms of velocity pressure.

When air flows at a velocity of 4,005 ft. per minute, the velocity pressure of the air stream is exactly equal to 1.0 inch of water gage. If, in a given case, in which the air velocity is maintained at this given value of 4,005 feet per minute, the decrease in total pressure in the test section amounts to 0.14 in. of water, then the loss may be expressed as equal to 0.14 times the velocity pressure. Actually, most of the tests are made with velocities much lower than 4,005 ft. per minute, but in general the factor which is determined at one velocity applies fairly well over a wide range of velocities.

### Basic Pressure Loss Formula

In determining the total pressure against which the fan delivers air, the following equation is used:

$$\left( \begin{array}{c} \text{Pressure losses} \\ \text{in duct} \end{array} \right) + \left( \begin{array}{c} \text{V. P. at} \\ \text{register} \end{array} \right) = \left( \begin{array}{c} \text{Total pressure} \\ \text{of fan} \end{array} \right)$$

The values shown in Figs. 1 to 6 refer only to the first part of the equation, and do not include the velocity head of the air stream itself. In an actual installation, therefore, the pressure losses in a given duct and the pressure losses in all of the fittings in that duct are added together to obtain the "pressure losses in duct." The "velocity pressure at the register outlet" is then added to it to obtain the "total pressure" against which the fan is delivering air.

For convenience in practical application of the data, the writer has converted the values listed in Figs. 1 to 6 to terms of "equivalent length of pipe diameters." A loss of "10 pipe diameters" means that the frictional loss of a 6-in. elbow is equivalent to the loss in a straight pipe whose length is 10x6 in. or 5 ft. If the elbow were 18 in. in diameter, the loss under the same conditions would be equivalent to the loss in 18x10 in. or 15 feet of straight pipe.

### 1. Round Elbow






It may be noted that when the elbow has a radius, "R", less than approximately 1.5 times the pipe diameter the friction loss is excessive. Good prac-

Case Description No.	Pressure Loss in terms of Velocity Pressure, (V.P.)	Equip. Diam.
TURNING VANES a	0 0.5 1.0 1.5 2.0 2.5 1.03 V.P. 0.88	D 51 44
8. c	0.35 0.38	18 19
9. d	0.14	7
ALL ELBOWS 12 1/2 in. square		
SPLITTERS a	Tests based on 12 in. x 12 in. duct, 1800 f.p.m. velocity 90° elbows followed by duct. 1.05 V.P. 0.70 0.45 0.30	52 35 22 15
9. b	0.37 V.P. 0.16 0.12 0.09	18 8 6 5
c	0.22 V.P. 0.13 0.10	11 6 5
10	ASPECT RATIO - RELATION OF WIDTH (L) TO DEPTH (W) = L/W 1.40 V.P. 1.29 1.05 0.92 0.73	70 64 52 46 36
11	Based on 12 1/2 in. square elbow with R/W = 0.9 0.36 V.P. 0.28 0.21 0.19 0.15	18 14 10 9 7
12	Size has little effect on elbow losses (MADISON & PARKER)	

Case Description No.	Pressure Loss in terms of Velocity Pressure, (V.P.)	Equip. Diam.
1. ROUND ELBOW 	0 0.5 1.0 1.5 2.0 2.5 0.14 V.P. 0.14 0.16 0.17 0.20 0.26 0.38 (Values based on tests made with pipe attached to outlet of elbow)	D 7 7 8 9 10 13 19
2. SHARP CORNER 	0.75 V.P. (With pipe)	37
3. SHARP CORNER 	0.87 V.P. (With pipe)	43
4. SQUARE ELBOW 	0.11 V.P. 0.12 0.12 0.13 0.16 0.22 0.37 (With pipe)	5 6 6 7 8 11 18
5. SHARP CORNER 	1.05 V.P. (With pipe)	52
6. SHARP CORNER 	1.15 V.P. (With pipe)	57
7. TURNING BLADES 	Elbow without turning blades 0.90 V.P. Same elbow with turning blades 0.22 V.P.	45 11





Case No	Case Description	Pressure Loss in terms of Velocity Pressure, (V.P.)					Equiv. Diam.
		0	0.5	1.0	1.5	2.0	2.5
28	RE-ENTRANT PIPE 	0.87 V.P.					43
29	FLUSH ENTRY 	0.48 V.P.					24
30	CONE ENTRANCE 	0.22 V.P.					11
31	FLARED ENTRY 	0.15 V.P.					7
32	BELL MOUTH ENTRY 	0.025 V.P.					1

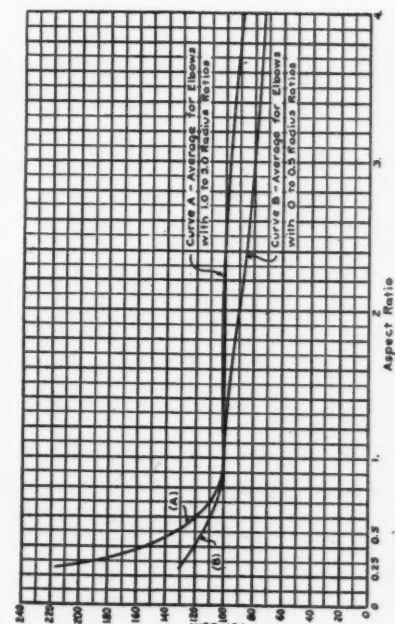


Fig. 8—Pressure loss in per cent of an aspect ratio of unity for average radius ratios. From Madison and Parker.


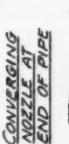
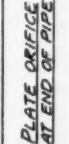
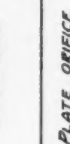
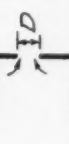
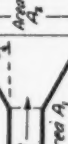

Case No	Case Description	Pressure Loss in terms of Velocity Pressure, (V.P.)					Equiv. Diam.
		0	0.5	1.0	1.5	2.0	2.5
23	ROUNDED ORIFICE & PLENUM CHAMBER 	0	0.13 V.P.	0.15 V.P.	0.12 V.P.	0.10 V.P.	6
24	CONVERGING NOZZLE AT END OF PIPE 	0	0.10 V.P. at D	0.11	0.11	0.10	5
25	PLATE ORIFICE AT END OF PIPE 	0	0.12	0.12	0.12	0.10	5
26	PLATE ORIFICE & PLENUM CHAMBER 	0	0.12	0.12	0.12	0.10	5
27	DIVERGING SECTION 	0	0.12	0.12	0.12	0.10	5
28	Flow into Plenum 	0	0.12	0.12	0.12	0.10	5
29	Flow out of Plenum is same 	0	0.12	0.12	0.12	0.10	5
30	Loss in regain of static pressure. (theoretical)	0	0.12	0.12	0.12	0.10	5
31	Regain = $e \left[ 1 - \left( \frac{A_2}{A_1} \right)^2 \right] h_1$	0	0.12	0.12	0.12	0.10	5
32	Evase stack	0	0.12	0.12	0.12	0.10	5

Fig. 8—Pressure loss in per cent of an aspect ratio of unity for average radius ratios. From Madison and Parker.

tice demands that the inner radius of an elbow shall not be less than the diameter of a round pipe.

### 2-3. Sharp Corner

The losses in elbows having a sharp inner corner may be equal to the losses in four ordinary elbows having smooth bends.

### 4. Square Elbow

For the same radius ratio the square elbows have slightly smaller pressure losses than do round elbows. The data of J. R. Parker were selected in preference to those given by Busey, Wirt, and other investigators.

### 5-6. Sharp Corners

Sharp cornered, square elbows are equivalent to 7 or 8 smooth-turn elbows as far as pressure losses are concerned. In every case, from Nos. 1 to 6 inclusive, the tests were made with pipes attached to the outlet of the elbows. It has been demonstrated by Busey that the loss is larger when no pipe is attached. However, since in most practical cases the elbows are followed by straight pipes, the smaller values have been tabulated.

### 7. Turning Blades

L. Wirt demonstrated that turning blades were of material assistance in reducing pressure losses in sharp bends.

### 8. Turning Vanes

A. I. Brown substantiated these tests and showed that vanes of simple design were almost as effective as the more complex blade used by Wirt.

### 9. Splitters

Madison and Parker presented data on the use of splitters made of sheet metal. As noted in case 9c, the use of splitters is not as effective in bends of smoother proportions as their use in sharper bends. In fact for bends having a radius ratio greater than 1.5, very little can be gained by using splitters.

For sharp-cornered elbows, however, splitters are very effective, as shown in case 9a. In Fig. 7 is reproduced a diagram derived by R. D. Madison to show the proper locations of 1, 2, and 3 splitters.

### 10. Aspect Ratio

The aspect ratio is the relationship of the width of the duct to the depth of the duct. A rectangular duct which is 3 in. wide and 12 in. deep has an aspect ratio of  $3/12$  or 0.25. On the other hand, a duct which is 12 in. wide and 3 in. deep has an aspect ratio of  $12/3$  or 4.0. Large aspect ratios indicate "easy" bends and are accompanied by smaller frictional losses than bends having small aspect ratios.

Also, it may be noted from case 10b that for smooth elbows, the effect of the aspect ratio is not

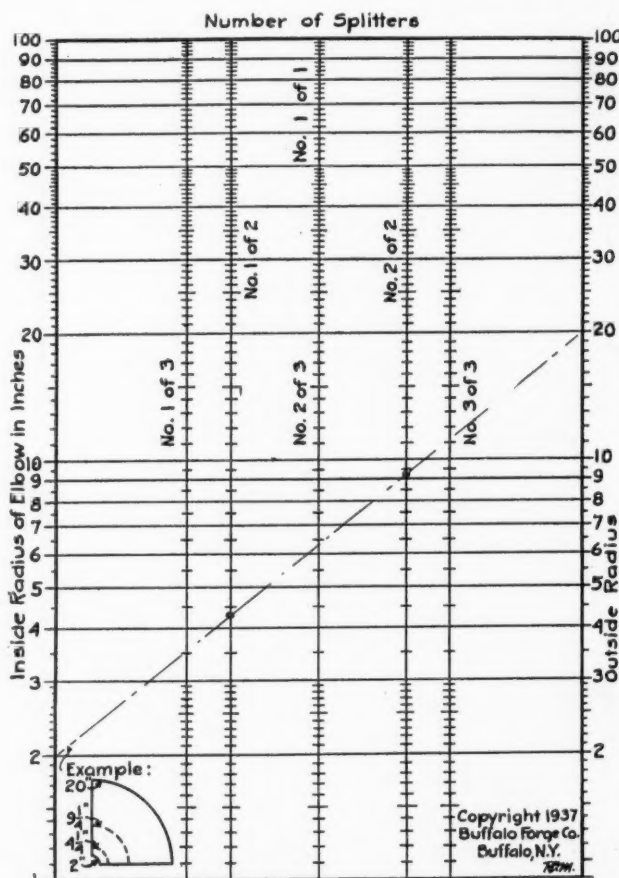


Fig. 7—Chart for determining proper spacing for one or more splitters where inside and outside radius is known. Prepared by R. D. Madison, Buffalo Forge Co.

as noticeable as in the case of sharper cornered bends. This is also shown in Fig. 8.

### 11. Elbow Angle

The assumption is usually made that an  $180^\circ$  elbow has twice the pressure loss of a  $90^\circ$  elbow. It may be noted from case 11 that such assumptions are conservative.

### 12. Size Effect

Madison and Parker have demonstrated that for ducts between 3 in. and 33 in. in size, the size of the duct has little effect on the pressure losses obtained.

### 13. Rectangular Elbows

The tests made in connection with the Holland Tunnel indicate that a "dead end" in a rectangular elbow materially increases the pressure loss.

### 14. Venturi Elbow

The tests by Busey and also by Williard indicate that a venturi elbow has smaller losses than  
(Continued on page 161)



# Look for Surprises

at the  
**WATERBURY**  
Exhibit  
Booths 338-339

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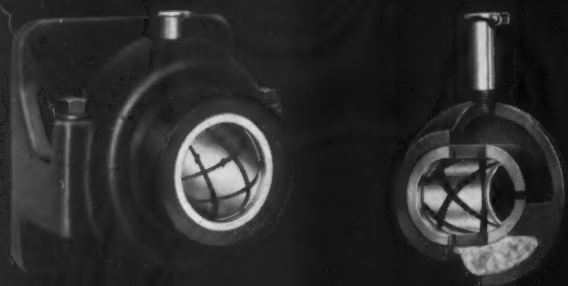
Again the majority of manufacturers of air conditioning equipment have standardized on Randall Pillow Blocks for their 1938 units. This is because the dependability and efficiency of Randall Pillow Blocks has assured an end to bearing troubles for manufacturer, contractor and user. Such preference can only indicate a record of highly satisfactory operation in the field.

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**RANDALL FLANGE or SIDE MOUNT  
PILLOW BLOCK**  
(DOUBLE RESERVOIR)

For side mounting only. Made for a complete range of shaft sizes. At right: cut-away section of ball used in Flange Pillow Block showing double reservoir oil return feature.

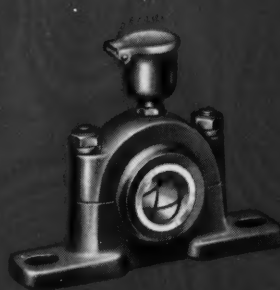
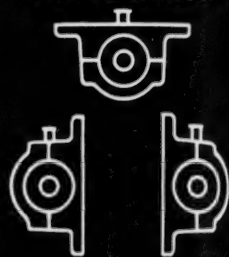
## RANDALL UNIVERSAL PILLOW BLOCK (DOUBLE RESERVOIR)

Can be mounted in any position. Unscrew the oiler, turn ball as desired and reinsert oil cup in a vertical position.



Cut-away section  
of Universal ball.

MOUNTS IN  
ANY POSITION



Standard Pillow Block—  
with large oiler.



Cut-away section of  
Standard ball showing  
large single reservoir.

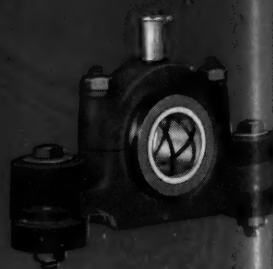


D. R. O. R. Pillow Block



Cut-away section of D. R.  
O. R. ball showing double  
reservoir oil return  
feature.

**Rubber Mounted Pillow Block—**  
For use where it is desired to isolate the supporting members at the contact point of the frame or blower housing and to absorb foreign noise and vibration.



# A Combination System

**T**HAT large school direct or indirect heating and ventilating installations can be handled in small shops was proved in a rather interesting manner in the installation pictured here. The school is in Merrill, Wisconsin, and the contractor was the Merrill Sheet Metal Works. While experience is desirable, this shop had never handled any such contract before. The ability to follow plans and specifications plus good judgment were, of course, necessary.

The entire fabrication and assembling was done on the job. The Manual Training room was used as a shop, and the brake was moved into this room. The entire job was made up from flat sheets, in gauges as follows:

26 gauge was used in all ducts up to and including 19 inches wide.

24 gauge from 19 to 29 inches wide, and 22 gauge from 30 to 60 inches wide.

All ducts above 60 inches wide were constructed of 20 gauge.

The sheet metal contractor also furnished and installed the grilles. He also constructed and erected the smoke breeching of 16-gauge black iron.

In estimating the amount of labor necessary, an ancient but well tried formula was used. On this type of work it has been estimated that a mechanic and helper can make and erect 150 pounds of iron per day. This means from the flat sheet to the erected and finished duct work.

The entire sheet metal contract was based on five thousand pounds, or approximately 33 working days for a mechanic and helper. It is interesting to note that exactly 32 days of eight hours each completed

the finished sheet metal duct work.

It is also interesting to note that the estimate was only 110 pounds under the actual five thousand pounds of sheets used.

While the plans were carefully checked for dimensions, and few, if any, changes were necessary, the procedure worked out very nicely to erect the work as fast as the ducts were made up. Any variation in dimensions was easily taken care of in this manner, and practically no waste resulted.

This installation was considerably reversed from the customary method of installations and fabrication. The contractor started at the end of all ducts and worked back toward the boiler room. The final work was all done in the boiler room and the sections were connected from where they passed through the brick walls to the horizontal heater.

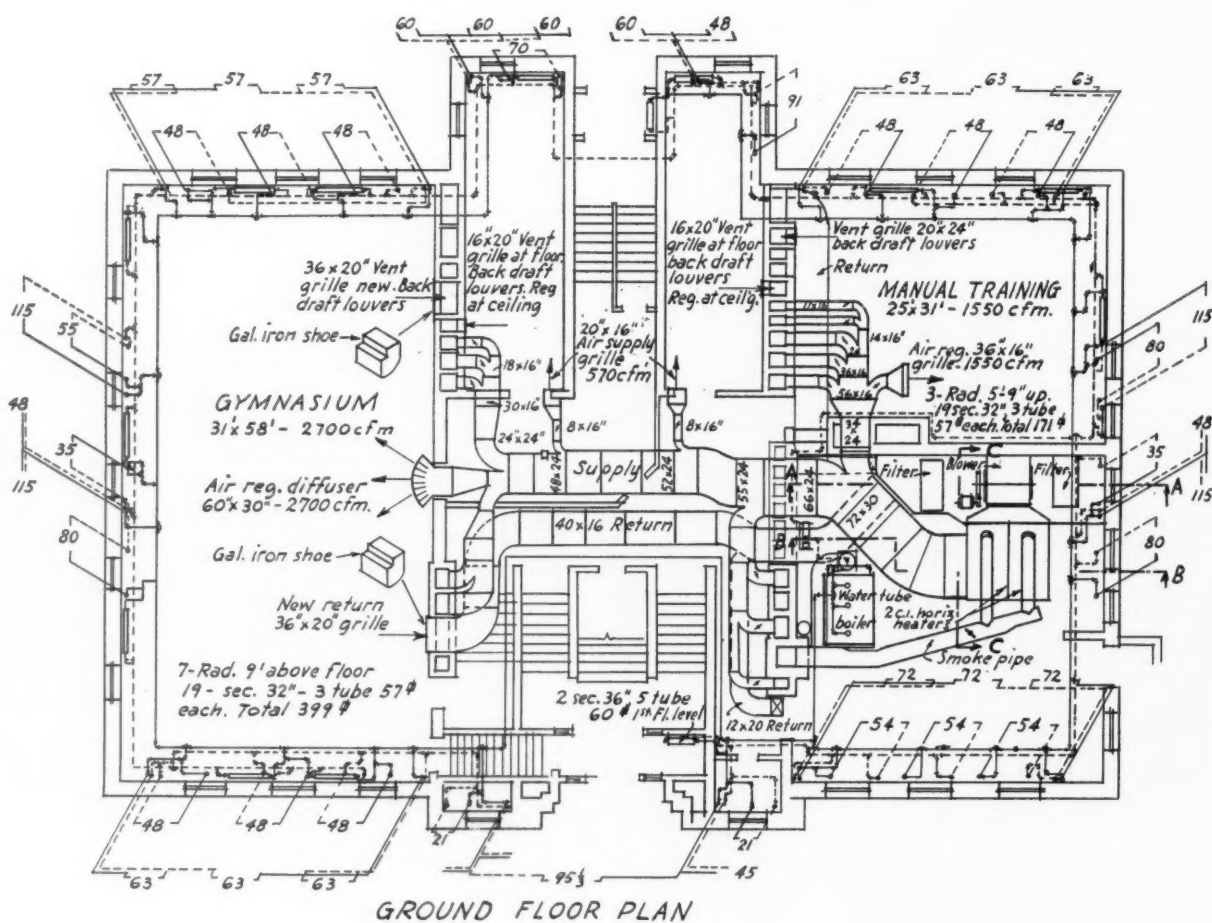
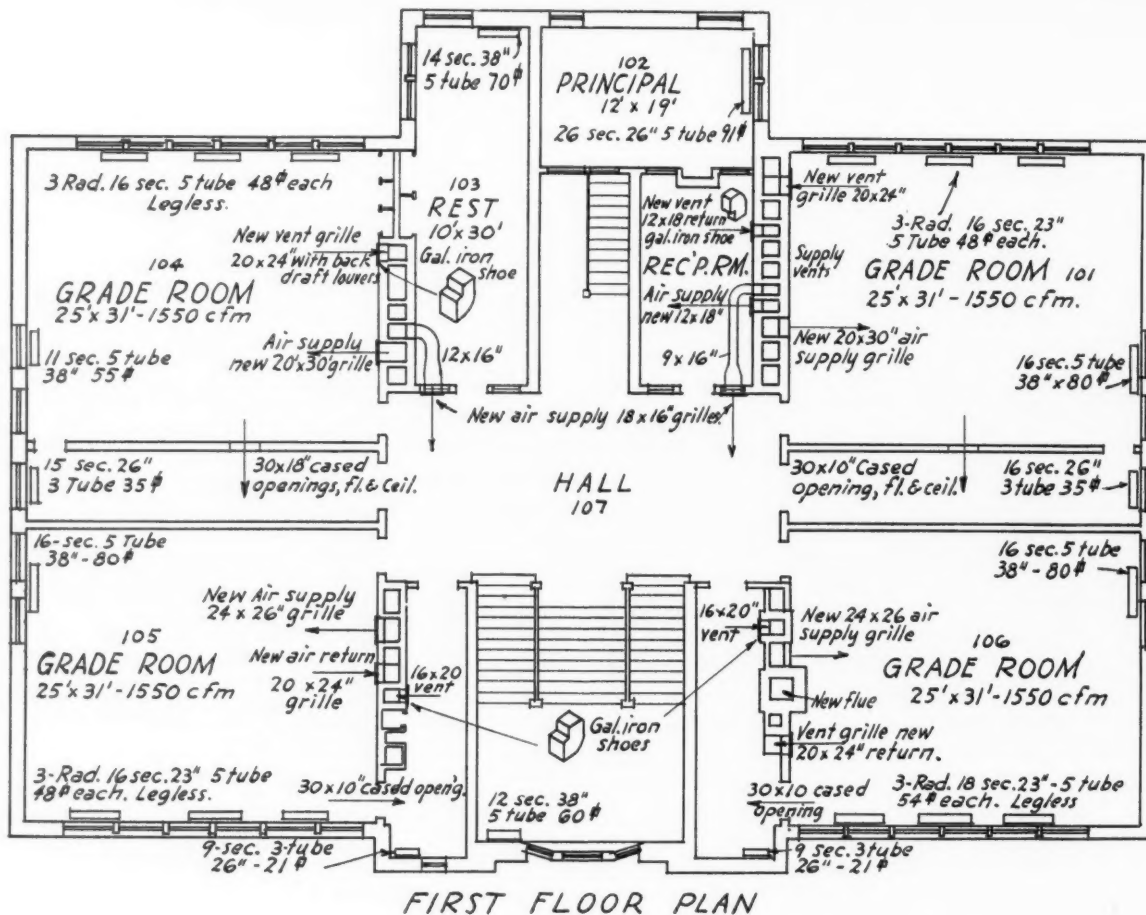
The accompanying views of the sheet metal work furnished a picture of the types of seams used. The large diffusers in the gymnasium were constructed by hand from drawings made by the engineer.

The building was not new, and some remodeling was necessary. A large number of the old flues were used, as this was an old underfloor, ventilation system. It was necessary to cut into these flues to take the exhaust air at the floor line. Where this was done, it was necessary to install sheet metal shoes as shown on the drawing, and where the air was exhausted directly out, back draft louvers were installed in the grilles.

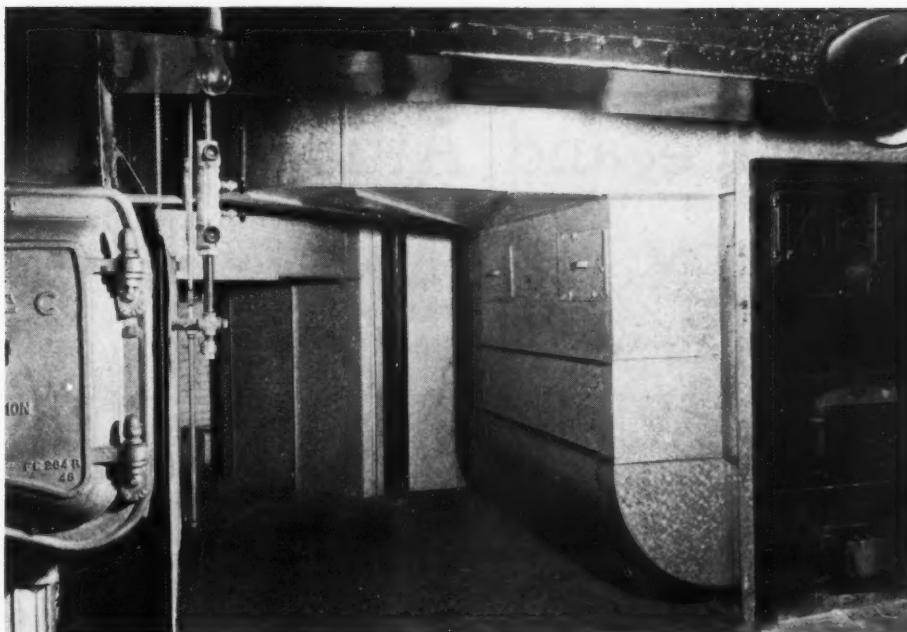
The main duct as shown is supply. There are two return air trunk lines. The entire system was designed for a duct loss of one-tenth of an inch of water.

N 30° E NW 35° E 10° SW 20° S 15° 10°		Based on -32° F. Cold Weather & Prevailing Wind From N.W. Bldg. Grade School Merrill Wis. Date _____ Or Loc. Sixth Ward Jefferson Twp. Co. Lincoln Exposure Factor _____ Archt. H.B.K. Engr. Platteau																		
MEASUREMENTS																				Totals
1. Room Dimensions 2. Ceiling Area 3. Floor Area 4. Wall Area 5. Ceiling Height 6. Floor Height 7. Wall Height 8. Total Wall Area 9. Total Floor Area 10. Total Ceiling Area 11. Total Wall Area 12. Total Floor Area 13. Total Ceiling Area 14. Total Wall Area 15. Total Floor Area 16. Total Ceiling Area 17. Total Wall Area 18. Total Floor Area 19. Total Ceiling Area 20. Total Wall Area 21. Total Floor Area 22. Total Ceiling Area 23. Total Wall Area 24. Total Floor Area 25. Total Ceiling Area 26. Total Wall Area 27. Total Floor Area 28. Total Ceiling Area 29. Total Wall Area 30. Total Floor Area 31. Total Ceiling Area 32. Total Wall Area 33. Total Floor Area 34. Total Ceiling Area 35. Total Wall Area 36. Total Floor Area 37. Total Ceiling Area 38. Total Wall Area 39. Total Floor Area 40. Total Ceiling Area 41. Total Wall Area 42. Total Floor Area 43. Total Ceiling Area 44. Total Wall Area 45. Total Floor Area 46. Total Ceiling Area 47. Total Wall Area 48. Total Floor Area 49. Total Ceiling Area 50. Total Wall Area 51. Total Floor Area 52. Total Ceiling Area 53. Total Wall Area 54. Total Floor Area 55. Total Ceiling Area 56. Total Wall Area 57. Total Floor Area 58. Total Ceiling Area 59. Total Wall Area 60. Total Floor Area 61. Total Ceiling Area 62. Total Wall Area 63. Total Floor Area 64. Total Ceiling Area 65. Total Wall Area 66. Total Floor Area 67. Total Ceiling Area 68. Total Wall Area 69. Total Floor Area 70. Total Ceiling Area 71. Total Wall Area 72. Total Floor Area 73. Total Ceiling Area 74. Total Wall Area 75. Total Floor Area 76. Total Ceiling Area 77. Total Wall Area 78. Total Floor Area 79. Total Ceiling Area 80. Total Wall Area 81. Total Floor Area 82. Total Ceiling Area 83. Total Wall Area 84. Total Floor Area 85. Total Ceiling Area 86. Total Wall Area 87. Total Floor Area 88. Total Ceiling Area 89. Total Wall Area 90. Total Floor Area 91. Total Ceiling Area 92. Total Wall Area 93. Total Floor Area 94. Total Ceiling Area 95. Total Wall Area 96. Total Floor Area 97. Total Ceiling Area 98. Total Wall Area 99. Total Floor Area 100. Total Ceiling Area																				
ADDITIONAL HEATER LOADS																				
33. Dining allowance 624# 34. Kitchen indirect radiation and aspir coils 35. Fan indirect radiation 624# 36. Hot water tank service 624# 37. Outside air heat loss up to room temp. 1043.000 38. Radiant air heat loss up to room temp. 22.000 39. Humidity service 4.000 40. Total Heater Load 41. Furnace 1,379.000 Boiler 100.000 Total 2419.000 42. 24.2 x 50" high																				





The boiler supplying steam at 1 pound pressure to the radiators is shown at the left. The two horizontal warm air furnaces which heat the mixed recirculated and outside air used for ventilation are shown at the right. The blower and filters are housed in the sheet iron room behind the furnace. See ground floor plan.



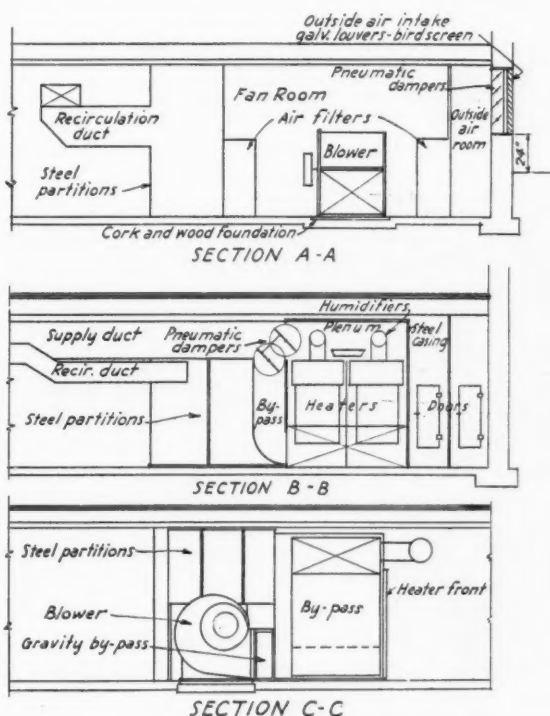
The installation as a whole is interesting, due to the fact that it is a combination of direct steam and furnace heating, and ventilation. A two pipe, low pressure, steam job was installed for the direct radiation. This radiation was figured for the heating load only. Two large horizontal furnaces were installed to heat the air for ventilation. About 50 per cent of the air is recirculated and the balance is taken from out of doors. One large double damper controls the temperature of the air for ventilation. This damper allows air to by-pass without being heated and is mixed with the warmer air that passes over the heater through this damper. This double acting damper is controlled by a duct thermostat,

that may be graduated from 70° to 90°.

In mild weather it is possible to heat the entire building with the furnaces alone. However, this does not allow for any temperature regulation while operating in this manner. When the entire system is working, temperature control is maintained by the action of the supply valves on the steam radiators. The temperature for the air for ventilation is, of course, controlled by the duct thermostat.

Wage scales will vary in different communities. However, in this particular locality with the mechanic at \$1.00 per hour, and the helper at 50c, labor cost a total of \$12.00 per day. With an average of 150 pounds per day erected the cost was about 8c per pound for the labor. If these sheets throughout average 5c per pound, we have a cost figure of 13c per pound to which we must add the overhead. This overhead, of course, concludes the cost of doing business, cartage and so forth.

We are not at liberty to divulge the contract price of this work, but the contractor made a fair profit.



Details through furnaces. See ground floor plan for location of the cross sections.



Equipment from the Merrill Sheet Metal Works was taken to the school where most of the metal was fabricated. Interior of the shop, John M. Reynolds, owner.

# Cooling Power of Furnace and Attic Ventilating Fans

G. B. Helmrich  
Mechanical Engineer  
The Detroit Edison Co.

AS the investment costs of cooling installations which have sufficient capacity to cool artificially a moderate size residence, or small commercial building, are still high enough to present a real obstacle to the general use of this type of cooling, such a comparatively simple device as the furnace fan or attic ventilating fan offers an attractive means by which summer comfort can be promoted at a nominal cost.

The circulation of cooler outdoor air in the early evening and night hours for ventilating and cooling purposes is, of course, not "Air Conditioning" in the generally accepted meaning of the word, but it can be justly considered a logical first step in what we are pleased to call "Comfort Cooling." This method of promoting summer comfort is especially attractive in cities located in the northern latitudes of our country, such as Detroit, because experience has shown the cooling season for residences in these localities to be comparatively short, and the use factor for artificial cooling equipment to be correspondingly poor.

The Detroit Edison Company sponsored experiments in residential and small commercial building cooling during the past five summers, beginning in the summer of 1932. Included in this program were several experimental installations of attic ven-

tilating fans and tests of furnace fans. Operating data have been collected on these several installations, and these data have been correlated from year to year with the experimental data gathered at the Research Residence at the University of Illinois, where experiments in summer cooling have been conducted during the same period. It is largely the experience gained with these experimental installations in Detroit, and the correlation with similar experiments conducted at the University of Illinois,\* which serve as the basis for this article.

## Furnace Fan

The furnace fan as installed in the modern mechanical warm air heating system can be adapted for circulating outdoor air for summer cooling at little or no additional expense, and its effectiveness as a cooling device will depend almost entirely upon its ability to circulate relatively large volumes of air.

The Detroit furnace fan tests, described in this article, were made in the same residence in which

\*A. S. H. V. E. Research Papers entitled, "Study of Summer Cooling in the Research Residence for the Summer of 1933" and "Study of Summer Cooling in the Research Residence for the Summer of 1934," by A. P. Kratz, S. Konzo, M. K. Fahnestock, and E. L. Broderick (Heating, Piping and Air Conditioning, December 1933 and January 1935).

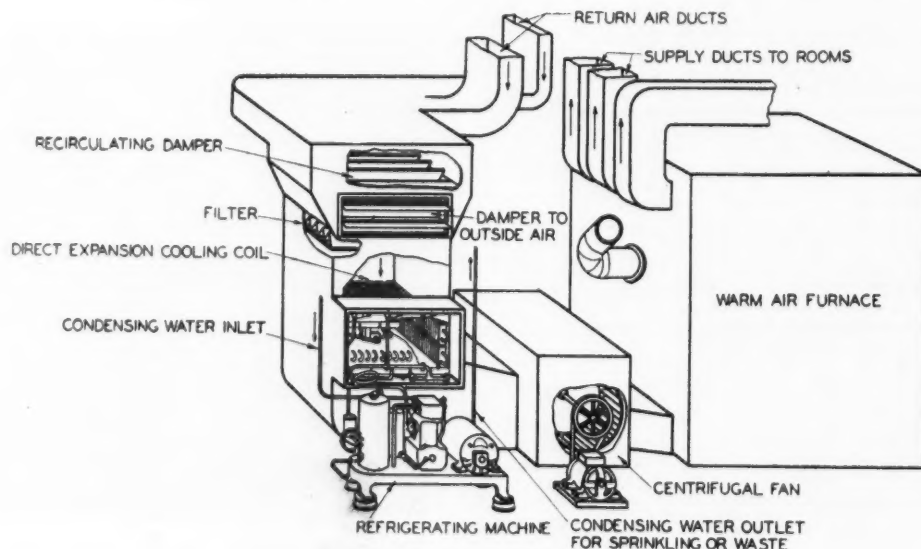


Fig. 1—Diagram of furnace fan installation.



TABLE I  
SUMMER COOLING IN A DETROIT RESIDENCE

Summary of Furnace Fan Operating Data for Summers of 1932, 1933, 1934, 1935, and 1936					
Year	1932	1933	1934	1935	1936
Total number of degree-hours above 85° during summer	529	1,408	1,345	540	1,847
Number of days of artificial cooling	22	22	23	14	18
Number of hours of artificial cooling	135	134	214	138	245
Number of hours of fan use only:					
Outdoor air cooling	57	120	6	57	11
Recirculation	...	...	114	23	115
Total number of hours of fan use	192	254	334	218	371
Electric energy used:					
Fan—kw-hr.	...	...	172	114	181

experiments in artificial cooling of the entire house by ice, and later by a two ton refrigerating machine, were conducted by The Detroit Edison Company for the past five summers. This residence (referred to in this article as The Detroit Edison Experimental Home, or simply the Detroit Residence) is of moderate size and has four rooms each on the first and second floors, with a maid's room on the third floor; a total of nine rooms with a volume of 19,200 cubic feet, or 17,200 cubic feet for the first and second floors only. The house is well insulated and the windows are shaded by either awnings or blinds during the cooling season.

#### Installation

The usual arrangement of a fan in a forced warm air heating plant is easily adapted to the installation of a simple damper arrangement on the suction side of the fan so that the recirculation can be cut off and the duct opened up to receive outdoor air, either through the basement or through an auxiliary duct connected to out-of-doors. Fig. 1 shows such an arrangement diagrammatically, as it was actually made in The Detroit Edison Experimental Home. The recirculation and outdoor air dampers were interconnected so that the manual operation of a single lever closed one damper and opened the other. In this arrangement the outdoor air was brought in by way of the basement through open basement windows. It should be noted also that, in the arrangement shown in this diagram, the dampers were located above the air filters so that the outdoor air, as well as the recirculated air, could be filtered. Such a feature is desirable, provided filters of ample area are installed, as otherwise the fan capacity will be seriously reduced by the friction loss (static pressure drop) through the filter.

#### Capacity Required

The modern furnace fan has a capacity sufficient to change the air in the rooms above from about four to six times per hour. Where a special effort has been made to provide for a liberal rate of air change for summer cooling, this capacity may be as high as seven to nine air changes per hour, and tests conducted at the University of Illinois indicate that this rate of air change for night air cooling is more effective than natural ventilation with only

partial window opening. It should be noted that fan capacities sufficient to change air in a six to eight room house, eight to ten times an hour, will have to be of the order of 2,000 to 2,300 cfm, and such capacities are much higher than required for winter heating. This requires that a simple means be provided for speeding up and slowing down the fan as the seasons require.

#### Method of Operation and Cooling Effect

It is obvious that the furnace fan can only be used effectively for cooling when the outdoor air temperature has dropped below that indoors. On very hot days, the crossing point for these two temperatures occurs around seven to nine p. m., and this is the time that the fan should be started if maximum benefit is to be obtained. Whether the fan is allowed to operate all night, or is shut off at the time of retiring, should depend upon the rapidity of the fall of outdoor temperature, and the intensity of the heat during the hours immediately preceding. The rate of air change for most furnace fans is, however, comparatively low, as they are installed primarily for circulating warm air rather than for ventilating purposes, and experience has shown that it is advisable to run them all night if the cooling effect is to result in improved comfort in the home during the night and the following day. The extra cost for about twelve hours of operation per night instead of five or six will not exceed ten cents per night.

Tests conducted at the Research Residence at the University of Illinois indicate that the use of a furnace fan to circulate from six to nine air changes per hour from the outdoors at night is much more effective than opening a few windows and depending upon natural ventilation, but it is significant to note that tests in this residence also showed that the use of full natural ventilation (all windows open) gave better cooling results than those obtained with the furnace fan.

Tests conducted for the past five summers at The Detroit Edison Experimental Home, where the furnace fan circulated about six changes of air per hour, show that a furnace fan of this size is not as effective for cooling purposes as is natural ventilation with the downstairs doors and the second story windows open, provided there is a perceptible air movement or breeze

outdoors. With little or no air movement outdoors however, the furnace fan will accomplish appreciable cooling and will be more effective than natural ventilation in houses, such as the Detroit Experimental Home, which have little "flue effect" to induce natural ventilation. The rather small reduction in indoor temperature resulting from furnace fan operation is not a true measure of the cooling accomplished, as the air movement produced by the fan plays a large part in improving comfort conditions. When used in conjunction with artificial cooling, the furnace fan can be used to advantage to recirculate air for two or three hours after the cooling system has been shut down, as this prevents the stratification of cold air at the floor level.

In the summer of 1933 the occupants of the Detroit Residence were requested to use night air cooling liberally, in conjunction with restricted daytime artificial cooling, but in the following summers, when its use was left entirely to the discretion of the occupants, the hours of night air cooling fell to negligible proportions. Table I shows the prin-

cipal operating data pertaining to the use of the furnace fan.

Experience at the Illinois Research Residence indicates that a two story house with ample attic space and several attic windows, and a large attic door, can be ventilated much more effectively by opening most of the windows and depending upon the stack effect of the structure to induce a flow of air, than can be done by using an unusually large furnace fan; one capable of circulating as much as nine changes of air per hour.

#### Effect on Cooling Load Following Day

The University of Illinois tests indicate that the furnace fan, circulating seven and one-half to nine air changes per hour for a twelve hour period, may be expected to reduce the seasonal cost of artificial cooling by about 20 per cent, when compared to the cost using partial natural ventilation. It would seem, however, that this saving has little real sig-

TABLE III  
SUMMARY OF DESIGN AND OPERATING DATA—EXPERIMENTAL ATTIC FAN INSTALLATIONS

Location of Fan Installations	Mt. Clemens Office	Residence	Residence	Residence	Residence
Type and Number of Fans .....	2—Propeller	1—Propeller	1—Propeller	1—Propeller	1—Propeller
Fan Mounting* ....	Pent House	Window at end of Attic	Head of Attic Stairway	Window at end of Finished Hall	Air Box in Attic over Grille in 2nd floor Hall
Diam. of Fan Wheel Inches .....	30	20	21 1/4	24	24
Fan Speed—rpm....	High 689 Low 395	1124 730	900 600	850 580	800 Medium 630 480
Capacity—cfm. ....					
Shop Test (open flow) .....	High 8769 Low 4771	3616 2591	3060	4563 3250	5313 Medium 4321 3369
Field Test .....	High 6474 Low ....	2800 2124		4040 2980	4250 Medium 3450 2700 Estimated
Motor Drive .....	3/8 h.p.—110 volt a-c dir. connect.	1/8 h.p.—110 volt a-c dir. connect.	1/8 h.p.—110 volt a-c dir. connect.	1/4 h.p.—110 volt a-c dir. connect.	1/4 h.p.—110 volt a-c dir. connect.
Noise—Decibels at 3 ft. Radius....	High 65.3 Low 51.7	64.3 52.3	....	63 52.3	66.9 52 Medium 60
Volume of Space Ventilated—cu. ft. ....	56,660	5540	5000	3rd floor—2948 2nd and 3rd floor—9731	6625
Rate of Air Renewal—Changes Per Hour .....	14	24	37	25	31 Estimated
Power Input—Watts	550†	250	252	350	445 Medium 325 230
Electricity Consumption for 1934 kw.-hr. ....	1029	183	....	33	162
Hours of Operation. Cost of Electricity—1934 Season—2.25 cents/kw.-hr.	1034 \$23.15	.... \$4.11	....	.... \$0.74	.... \$3.64

\*All fans were bolted to specially designed wood frames which were insulated from the building by sponge rubber blocks.

†Each Fan.

nificance when the same series of tests show that full natural ventilation at night accomplished an ever greater saving without, of course, any expenditure being required for fan power during the period when artificial cooling was not used.

Tests at the Detroit Residence show that operation of the furnace fan, circulating six air changes per hour for about a twelve hour period, has no measurable effect on the need for artificial cooling the following day. The cooling accomplished by the fan is confined to the period of operation and there seems to be no appreciable cooling of the building structure which can be credited particularly to furnace fan operation.

### Cooling by Recirculation

During the summer of 1936, tests were made in the Detroit Residence to determine the cooling power of the furnace fan when used to recirculate air through the house during the daytime. Since the only cooling effect that can result from recirculating air is that caused by the motion of the air itself, the problem of determining this cooling power is essentially that of accurately measuring the velocity of the air and then, by the use of the comfort chart, of determining the effective temperature corresponding to this velocity. As the velocities to be measured are very low, the most practical instrument for field use is the Kata-thermometer. This instrument is essentially an alcohol thermometer with a large bulb, and a stem about seven inches long, and so graduated that the cooling power of the air and its velocity can be determined by noting the number of seconds required for the meniscus to fall a given distance when the instrument is held in the air.

The tests were made in the living room where the air is supplied through two baseboard registers at a velocity of about 320 fpm. The volume of air supplied to the room was 300 cfm, or at the rate of 7.4 air changes per hour. The velocities and temperatures are shown in Table II.

### Recirculating Basement Air

The recirculation of air through the basement can only accomplish a limited degree of cooling over a short period as the basement temperature tends to become equal to that of the rooms above. This method of fan operation also frequently causes excessive dampness in the basement due to condensation on the cool walls and pipes.

### Table of Cooling Results

It will be seen from the table that the air movement produced by the fan was only sufficient to reduce the effective temperature one degree, which is equivalent to about a two degree drop in dry bulb temperature. It is probable that the rate of air change would have to be of the order of fifteen per hour if appreciable cooling by recirculation is to be accomplished, and this would require a fan capacity nearly three times the size usually installed.

### Operating Cost

A furnace fan large enough for an eight room, two story residence can be operated in the summer time to handle about 1,600 cfm of air, and its power input will be of the order of 450 watts when driven by a one-half horsepower motor. Our Detroit experience indicates that night air cooling might be used as much as 300 hours for the season and, at two and one-fourth cents per KW-hr, the electrical energy cost for the season for night air cooling only would be \$3.04 for such a fan and about \$4.50 for a fan circulating nine air changes per hour. The actual maximum cost for the Detroit Residence, when artificial cooling was used in the daytime, was \$1.24 in the summer of 1933. The operating hours at the Illinois Research Residence, due to a warmer climate, are about twice as high as in Detroit. For 600 hours per season, using the Detroit rate for electricity, the season's operating cost would be about \$9.00.

### Attic Fan

The second step in improvement to summer comfort may well be the installation of an attic ventilating fan. Experiments with the attic fan were initiated by The Detroit Edison Company in 1932, and several experimental installations were made in that summer and in the two succeeding summers.

### Installation Schemes

It is obvious that the scheme of installation of an attic fan will vary with the local conditions met in each case, but one principle may well be kept in mind, and that is, that the path of the air through the open windows, through the rooms to be cooled, and to the fan should be as direct as is practicable, if the full fan capacity is to be utilized. Fig. 2 shows diagrammatically how an attic stairway was

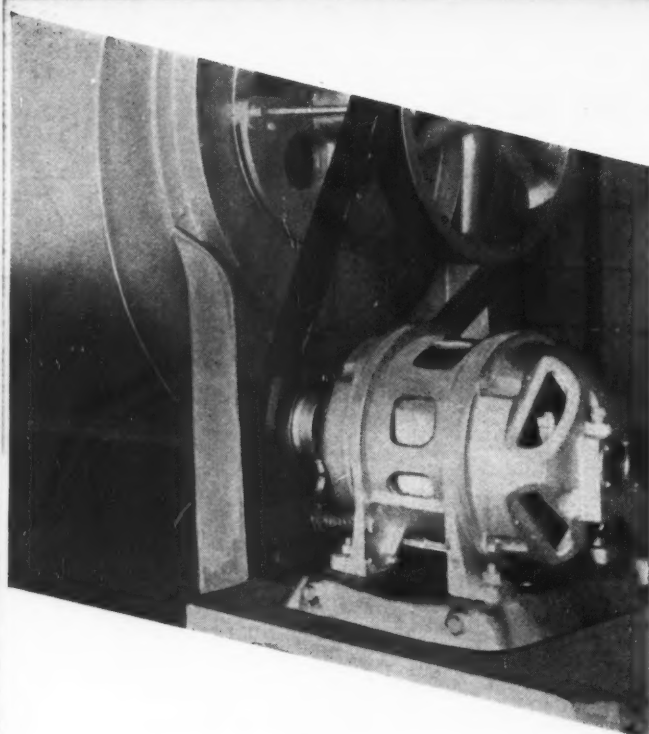
(Continued on page 164)

TABLE II  
COOLING BY RECIRCULATION OF AIR BY FURNACE FAN

Date and Time Aug. 3, 1936	Fan Operation	Outdoor Air		Indoor Air — Living Room	
		Dry Bulb Temperature	Effective Temperature	Dry Bulb Temperature	Air Velocity at 38" Level fpm. Effective Temperature
3:00 p. m.	Fan Off	92°	71°	76°	8
4:30 p. m.	Fan On—Complete Recirculation	92°	72°	77°	32
5:00 p. m.	Fan On—Recirculation Through Basement	92°	72°	78°	42

\*Corresponding effective temperature for still air—73°





# Small Motors for Residential Air Conditioning

By C. H. Lankford  
Century Electric Company

**A**IR-CONDITIONING today, including heating, ventilating, refrigeration and all accessory processes, is universally a series of duties involving the conversion of electrical energy into mechanical energy. So, to make the story complete, it requires a little knowledge of what makes the wheels go around.

## Single Phase Alternating Current Motors

The current supply in the United States is most generally 60 cycle and is available in voltages 110, 208, 220, 440 and 550. For domestic service the universal

practice is 110 volts with the exception of the larger installations where 220 volt current is supplied.

### A. Non-starting single phase motor.

A motor constructed after the fashion of the diagrammatic sketch shown as Fig. 1 would run after once being started as long as the field was supplied with single phase, alternating current of the proper voltage and frequency.

Obviously, a motor which had to be started by external, mechanical means would not be a practical sort of a thing, therefore, it is not produced commercially

## DEFINITIONS

### ELECTRIC MOTOR

A rotating machine for converting electrical energy or electrical power into mechanical power.

### STATOR OR FIELD

The stator or field of an electrical motor is the stationary part within (in some cases around) which the second or rotating member revolves.

It is common usage to refer to the fixed winding of an alternating current motor as a stator and the fixed winding of a direct current motor as a field.

### LAMINATIONS

Thin sheets of magnetic iron punched to shape used to build up the magnetic circuit.

### FIELD CORE

A large number of slotted or punched laminations stacked or assembled together in a field shell to take the field winding.

### ROTOR OR ARMATURE CORE

A large number of laminations assembled on the shaft properly punched to accommodate the rotor winding.

### AIR GAP

The clearance between the field and rotor cores which allows for rotation without interference or rubbing.

### CONDUCTORS

Copper wires or bars placed in the slots of field and rotor cores to form the windings.

### SLOTS

Notches punched out of field and rotor lamina-

tions to accommodate the conductors used to make up the windings.

### FIELD COIL

An individual group of conductors or wires forming one section of the field winding or field circuit.

### ARMATURE COIL

A group of conductors composing one part or one circuit of the winding in wound rotor motors.

### COMMUTATOR

An assembly of bare copper bars to which armature coils of wound rotor motors are connected. The commutator is the means used to conduct current to and from the armature winding by means of stationary brushes which bear on the commutator.

### ROTOR BARS

Conductors of bare copper used to make up individual conductors in the squirrel cage winding.

### SQUIRREL CAGE WINDING

The motor winding of induction motors. This winding consists of a number of round or rectangular bars assembled in the motor slots and connected together at each end by solid copper rings called end rings.

### INSULATION

Non-conducting material such as, rubber, silk, cotton, mica fibre, insulation varnish, etc., used to insulate individual conductors from adjacent conductors and individual coils from adjacent coils. (No insulation is used on squirrel cage rotors.) c

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*"Special"*  
OIL FIRE



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*Manufacturer of the famous Moncrief Cast and Steel Furnaces*



FIG. 1  
NON-STARTING  
SINGLE PHASE MOTOR

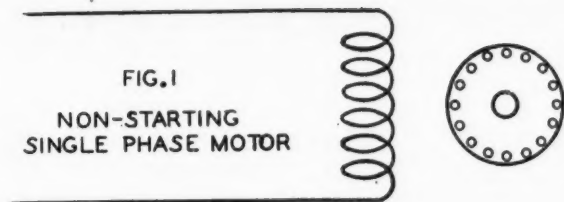


FIG. 2  
SHADED POLE  
SELF STARTING  
SINGLE PHASE MOTOR

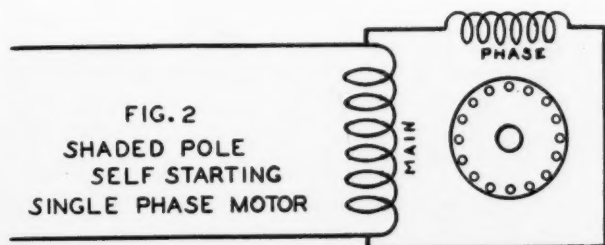


FIG. 3  
SELF STARTING  
SINGLE PHASE MOTOR  
WITH PHASE COIL CUTOUT

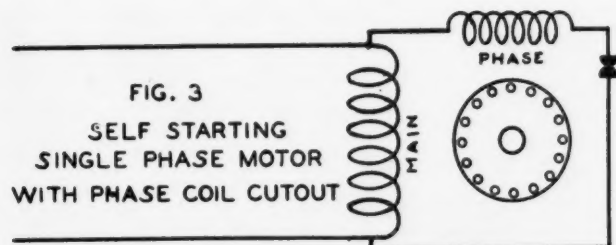


FIG. 4  
REPULSION START AND RUN  
SINGLE PHASE MOTOR

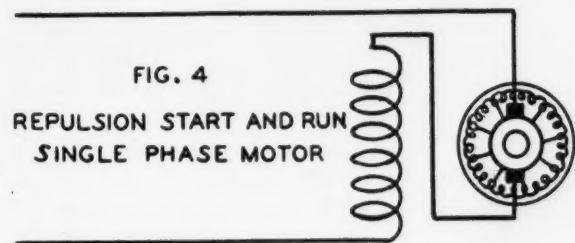
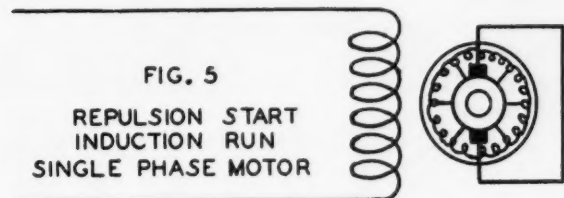


FIG. 5  
REPULSION START  
INDUCTION RUN  
SINGLE PHASE MOTOR



excepting in the case of some very small sizes, principally for electric clocks.

#### B. Shaded pole self-starting single phase motors.

To produce some starting or turning effort in single phase motors, we resort to various devices, one of which is called a phase coil or shading coil. Such a construction would be diagrammatically illustrated by Fig. 2. Here we have two magnetic fields set up across the rotor, one of which is produced by the main field winding and another by the phase coil. The push or pull of these two magnetic fields acts in slightly different directions and in this manner gives the armature a tendency to rotate and produce mechanical

power. This type of construction is found in small fan motors and small power motors, usually in the order of 1/50 HP or less; still not practical devices so far as household air-conditioning is concerned.

#### C. Split phase self-starting single phase motors.

To produce a greater amount of starting torque or starting effort requires more current in the phase coil. Therefore, the next step is to provide the split phase with a heavier winding which will permit the motor to take the heavier current necessary. This, in turn, introduces a design problem. The heavy winding requires so much current that it cannot be allowed to stay in the circuit more than a very few seconds during the starting period. So, to remedy the situation, a cutout is inserted in that portion of the circuit, which by some form of governor or timing device usually mechanical, it is removed after the motor has had time to get up the speed.

This is a very common type of power motor and is frequently seen on domestic appliances such as washing machines, blowers, home shop tools, and many other simple drives where only a moderate amount of starting torque is required. This motor is diagrammatically illustrated by Fig. 3.

#### D. Repulsion start and run single phase motors.

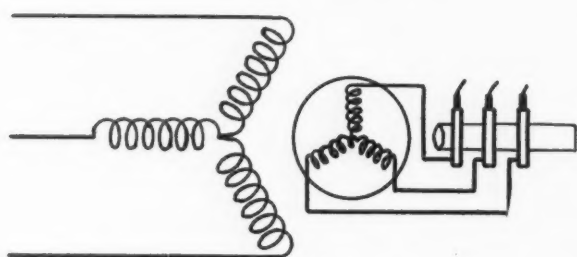
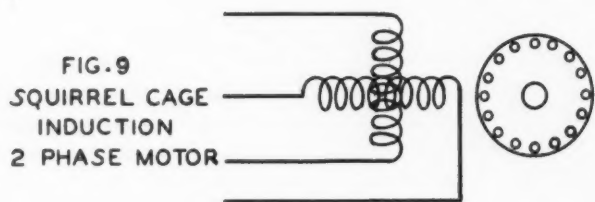
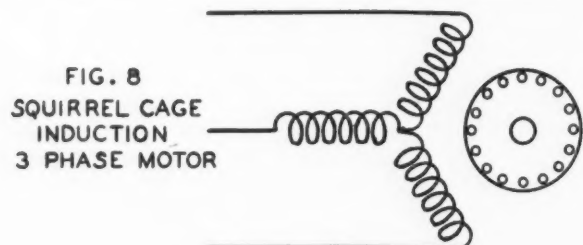
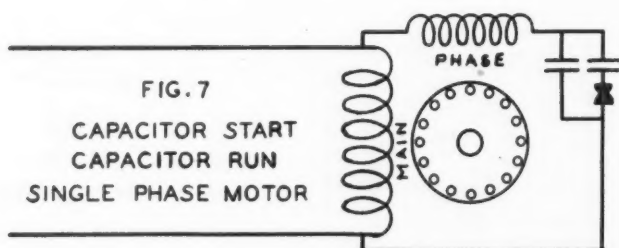
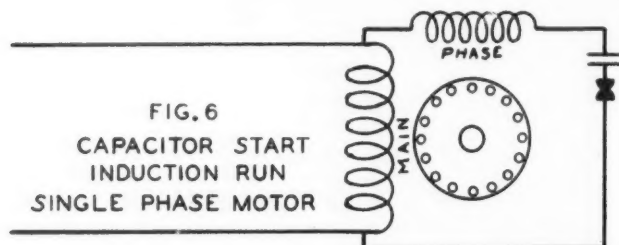
All the motors discussed up to this point have been those built with cage type rotors. It is possible to build a wound rotor motor. Such a motor has a winding very similar to a direct current motor and the current which supplies the field winding passes through the rotor armature winding as well; as series connection such motors are generally limited to sewing machines, vibrators, mixers, domestic vacuum cleaners, toys, and other small applications. The construction is illustrated diagrammatically by Fig. 4.

This type of motor is not generally used for continuous duty operation nor applied where it would be operated during the so-called leisure hours of the day because it is a first-class generator of radio interference.

#### E. Repulsion Start Induction Run Single Phase Motors.

The next step is to secure a motor with greater starting efficiency or a motor which will produce more torque with less starting current. The greatest starting torque is necessary to satisfy the requirements of some of the machines themselves and the lower starting current is to reduce voltage fluctuations and keep everybody happy, including the users' neighbors as well as the public utilities serving the current. Such a motor is illustrated diagrammatically by Fig. 5.

This motor, like the one previously discussed, has a wound rotor or armature as well as a wound field. In this case, however, the field only is connected to the line and generates current in the armature or rotating element by means of induction, the same as in the case of the squirrel cage constructed motors described earlier. The principal difference, however, lies in the starting method which is accomplished by two or more short-circuited brushes resting on the commutator to which the armature winding is connected. This arrangement provides for both the high starting torque



and the low starting current just set down as being very desirable features. Then to eliminate the undesirable features of the motor operating continuously on the brushes, arrangements are made mechanically to short-circuit the armature or secondary winding and remove the brushes from service after which the motor operates the same as a standard squirrel cage motor or the same as the non-starting, single phase motor after it is up to speed.

#### F. Capacitor Start Induction Run Single Phase Motor.

In more recent years a motor starting device which has been known for a long time to laboratory techni-

cians and electrical designers in general, has been employed for the starting of squirrel cage constructed, single phase motors. This is the condenser type of motor, or more lately called capacitor motor.

The capacitor start, induction run motor has a condenser inserted in an auxiliary winding in which the condenser acts as a phase displacement unit and so produces torque for somewhat the same reasons given in the case of the split phase motors.

A motor using this condenser or capacitor for starting purposes, only, is provided with a mechanical or electrical cutout to remove that portion of the winding from the circuit after the motor has been given an opportunity of coming up to speed. This construction is illustrated by Fig. 6.

#### G. Capacitor Start Capacitor Run Single Phase Motors.

In those cases where it is desired to secure some of the benefits of the capacitor during the running as well as the starting period, a condenser of greater capacity is used and is left permanently in the circuit. This is shown in Fig. 7.

### Polyphase Motors

#### A. Squirrel Cage Induction 3 Phase Motors.

In this type of motor the designation of the squirrel cage rotor construction enters the actual naming of the motor for the first time.

Motors having a polyphase field (2 phase or 3 phase) will start, come up to speed and operate continuously as an induction motor solely from the currents induced in the rotor from the energy fed into the field winding. A 3 phase squirrel cage induction motor is illustrated by Fig. 8.

#### B. Squirrel Cage Induction 2 Phase Motors.

This motor operates on exactly the same principle as the 3 phase motor with the exception that the source of supply is 2 phase instead of 3 phase and because the phases are ordinarily separated instead of interconnected, a four wire system is usual.

With polyphase motors a large variety of starting and running characteristics may be produced by variations in the field or rotor windings or both without any deviation from the underlying principle. This is shown in Fig. 9.

#### 1. Wound Rotor Induction Polyphase Motor.

This type of motor, often times referred to as a slip ring motor, consists of a polyphase field identical with that used for the squirrel cage induction motor and with a wound rotor or secondary winding, with leads brought out to the contactor rings on the shaft of the motor, from which leads are carried to external starting or speed regulating resistances. Such construction is illustrated diagrammatically in Fig. 10.

### Direct Current Motors

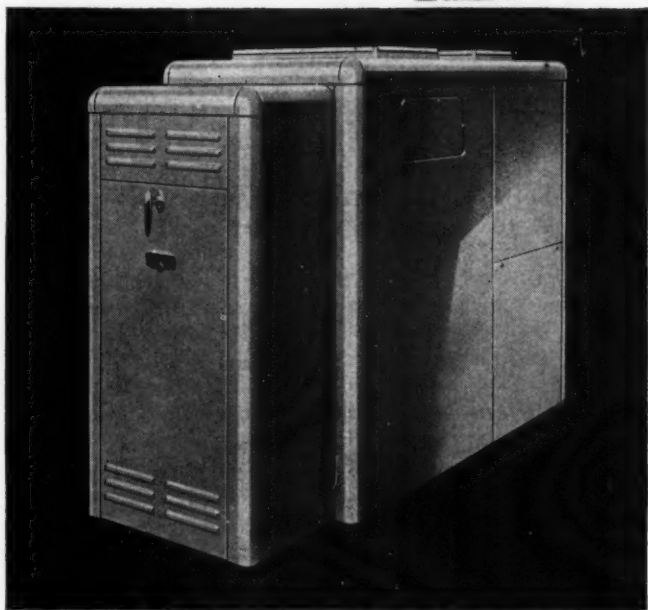
#### A. Series Wound DC Motor.

As the name would indicate, this is a case where all windings of the motor are in series or connected  
(Continued on page 180)

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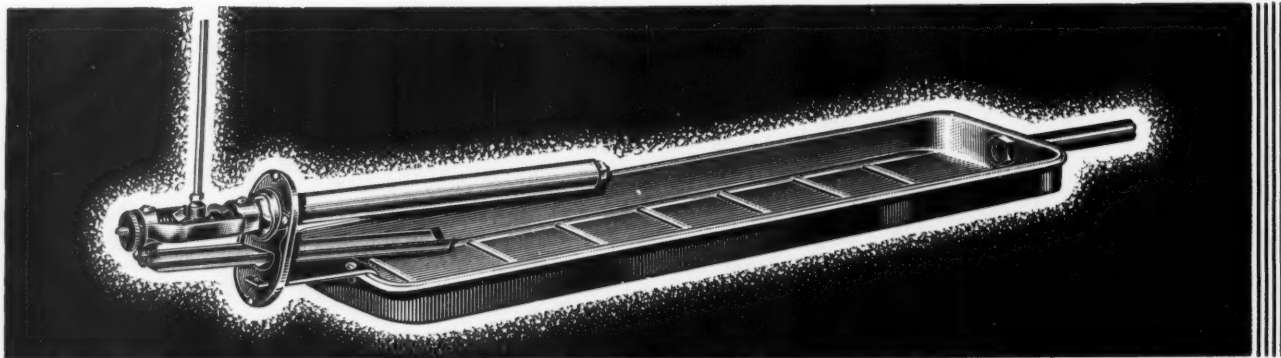
General Offices: ARCHITECTS BLDG., 101 PARK AVENUE, NEW YORK, N. Y.

Works: Oswego, N. Y.

Branches and Representatives in Principal Cities

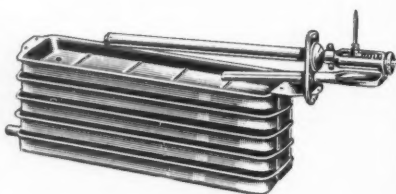
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Another profit-possibility for you is presented in this new Thermo-Drip development. No longer is it necessary for you to pass up sales of humidifiers for winter air conditioning plants with plenums which will not accommodate long pan humidifiers. The Thermo-Drip, with its three, four or five 18-inch pans, is definitely the answer. All the time-proved, basic features and the high efficiency of Thermo-Drip are incorporated in this series. It provides up to 7½ ft. of water travel—up to 360 sq. in. of evaporating surface—adequate for all requirements of modern winter air conditioning.

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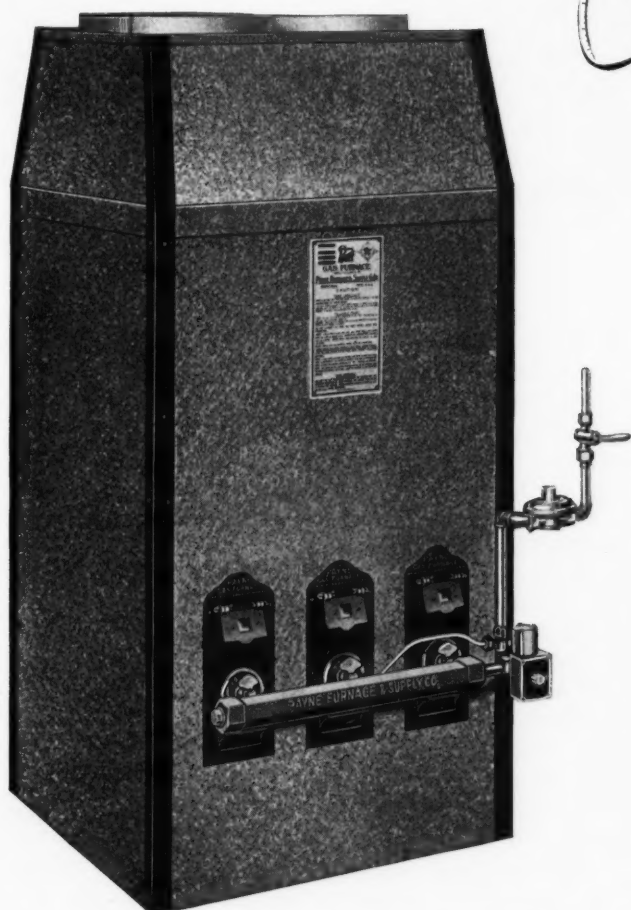
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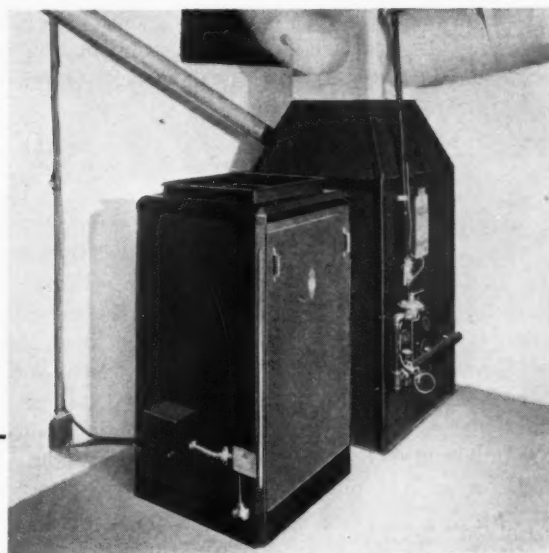
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## Pattern Development for

# Air Conditioning Fittings\*

By William Neubecker

Head Instructor

Sheet Metal Department, New York Trade School

## A Short-Cut Transition Offset

A READER requests the publication of a short-cut rule for laying out the patterns for a transition offset with a flat back, from a 4 x 2-inch riser to a 2 x 4-inch duct which continues across the ceiling. The riser connection is offset one-half of its width as shown in the perspective in Fig. D and in the plan in Fig. E in the accompanying illustration.

In this connection, it may be proper to say that the short-cut method which will be shown herewith, is applicable to any type of transition with either a flat back, flat top or flat bottom, regardless what the dimensions may be, or whether the offset is square at one end and rectangular at the other or square or rectangular at both ends in reverse positions.

All short rules are the result of a knowledge of the true geometrical principles in developing pattern shapes. When these principles are understood, then short rules can be devised. Short or "snap" rules are not geometrically accurate, but they save time in laying out, when accuracy is not essential.

The problem presented by our reader is an interesting one in both projections and developments and for the benefit of those who desire the true geometrical development as well as the short-cut method, the problem will be developed, first by the true geometrical rule and then by the short method with an explanation of the principles involved, so that one can compare the difference in the two developments.

### True Geometrical Rule

In Fig. E let 1-5-6-9 represent the side elevation of the transition, the throat being struck from the center *O*. To find the center for striking the heel, so that a graceful curve can be drawn to maintain the full area throughout the offset, take the least distance as *O*-5 and set it off from 1 to *R*. From *R* draw a perpendicular line to intersect the horizontal line drawn from 5 at 4. With *R* as center and *R*-1 as radius, draw the quadrant 1-4 to complete the side elevation.

Before a true plan view can be drawn, the patterns

for the heel and throat must be developed. This plan view is not at all necessary in the development of the true geometrical pattern for the front, but is shown here as a good study in projections, a knowledge of which makes one proficient as a pattern cutter. Space the heel and throat in side elevation in any desired number of divisions as shown from 1 to 5 on the heel and 6 to 9 in the throat.

Now take the girth of the heel from 1 to 5 and of the throat from 6 to 9 and place the girths on the line 1-6, below the plan, as shown by similar numbers 1 to 5 and 6 to 9. From 1 and 9 erect perpendicular lines and make 1-1° and 9-9° equal to the narrow side of the transition. In a similar manner erect perpendicular lines from 5 and 6 and make 5-5° and 6-6° (both being similar) equal to the wide side of the transition. Draw lines from 5° to 1° and from 6° to 9°. Then will 1-1°-5°-5 be the net pattern for the heel and 6-6°-9°-9 the net pattern for the throat. From the various points 2, 3 and 4 on the line 1-6 erect perpendicular lines to intersect the line 1°-5° of the heel pattern at 2°-3° and 4°. In a similar manner from the various points 7 and 8 erect perpendicular lines to intersect the line 6°-9° of the throat pattern at 7° and 8°.

Now to complete the plan view, drop perpendicular lines from points 1 to 5 and 6 to 9 in elevation, indefinitely. Measuring in each instance from the line 1-6 in the heel pattern, take the distances to 1°-2°-3°-4° and 5° and set them off on lines dropped from similar numbers in the elevation, measuring in every instance from the flat back line *S*-*T* in plan, thus obtaining the intersections 1<sup>x</sup>, 2<sup>x</sup>, 3<sup>x</sup>-4<sup>x</sup> and 5<sup>x</sup>.

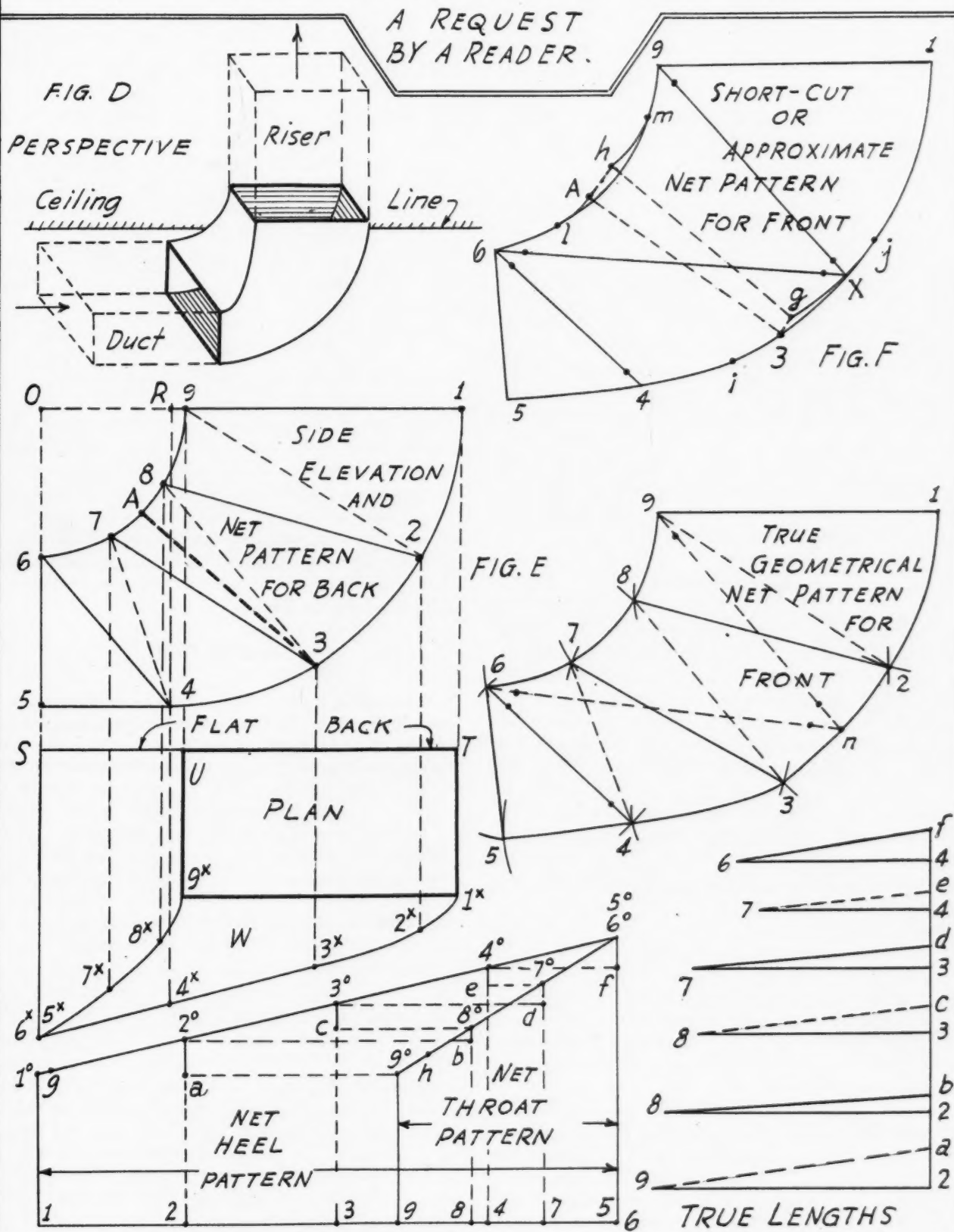
In similar manner measuring from the line 6-9 in the throat pattern take the distance to points 6°, 7°, 8° and 9° and set them off on lines dropped from similar numbers in elevation, measuring in every instance from the flat back line *S*-*T* in plan and obtain intersections 6<sup>x</sup>, 7<sup>x</sup>, 8<sup>x</sup> and 9<sup>x</sup>.

Trace the miter lines through points so obtained; then will *S*-*T*-1<sup>x</sup>-5<sup>x</sup>-*S* be the true plan view; *U*-*T*-1<sup>x</sup>-9<sup>x</sup> will show the rectangular riser and 1<sup>x</sup> to 5<sup>x</sup> and 6<sup>x</sup> to 9<sup>x</sup> the miter lines of the heel and throat respectively.

\*All rights reserved.



SHORT-CUT METHOD FOR DEVELOPING  
REVERSE TRANSITION WHICH OFFSETS ONE HALF  
OF ITS WIDTH COMPARED  
WITH A TRUE GEOMETRICAL DEVELOPMENT.



Draw solid lines in elevation from 2 to 8, 3 to 7 and 4 to 6 and dotted lines the shortest way across as from 2 to 9, 3 to 8 and 4 to 7. These solid and dotted lines then represent the bases of triangles to be constructed, whose altitudes or heights are equal to the differences in heights of the connecting numbers in elevation.

For example: To find the true length of the dotted line 2-9 in side elevation, set off this distance on the horizontal line at the lower right as shown by 2-9. At right angles to 2-9 erect the line 2-a equal to the difference in height between point 2 and 9 in the side elevation, which is found as follows: From 9 in the throat pattern draw a horizontal line to intersect the perpendicular line erected from 2 in the heel pattern, at a. 2°-a then indicates the desired difference shown in the true lengths.

Draw a line from a to 9 in the true lengths which is the true length of the dotted line 2 to 9 in side elevation. To obtain the true length of the solid line 2-8 in side elevation set off this distance in the true lengths as shown by 2-8. Now draw a line from 2° in the heel pattern to intersect the line erected from 8 in the throat pattern at b. Take the distance from b to 8° and set it off in the true lengths on the perpendicular line as 2-b. Draw a line from b to 8, the true length of the line 2-8 in side elevation. In this manner, all the true lengths of the various lines in elevation are obtained. By following the various horizontal lines which intersect the proper numbered lines erected in both heel and throat patterns, the various heights indicated by a, b, c, d, e and f are obtained and transferred to the true lengths as shown by similar letters.

#### The Front Pattern

The pattern for the front can now be laid out. Take the distance 1-9 in elevation, its true length, and set it off on the horizontal line 1-9 in the true pattern. With 1°-2° in the heel pattern as radius and 1 in the true pattern as center, describe a short arc near 2 and intersect it by an arc struck from 9 as center with 9-a in the true length as radius. Now with 9°-8° in the throat pattern as radius and 9 in the true pattern as center describe a short arc near 8 and intersect it by an arc struck from 2 as center with radius equal to b-8 in the true lengths.

Proceed in this manner using alternately first the proper numbered division on the *slant* line in the heel pattern, then the proper numbered true length; the proper numbered division on the *slant* line in the throat pattern, then the proper numbered true length, until the line 4-6 in the true pattern is drawn. Then with a radius equal to 6-5 in side elevation and 6 in the true pattern as center draw a short arc near 5 and intersect it by an arc struck from 4 as center with a radius equal to 4-5 in the side elevation.

Trace a line through points so obtained in the true pattern, then will 1-5-6-9 be the true geometrical pattern shape. When shaping this true front pattern, bisect the distance 1-4 and obtain point n from which draw lines to 6 and 9 which indicate where slight bends are made, so as to miter with the heel and throat pat-

terns. The pattern for the flat back is indicated by 1-5-6-9 in the side elevation. On all patterns allow edges for Pittsburgh lock; that is single edges on the back and front patterns and locks on the heel and throat patterns. What has just been demonstrated, is required for laying out a true geometrical front pattern shape, excepting as above mentioned, no plan view is necessary.

#### Short-Cut Method

Fig. F shows the pattern for the front laid out by the short-cut method. In laying out this approximate pattern the following rule must be observed: The girths of the heel shown from 1 to 5 and of the throat shown from 6 to 9 in Fig. F must be equal respectively to the length of the slant line 1° to 5° in the heel pattern and the length of the slant line 6° to 9° in the throat pattern as indicated below in Fig. E. As the girth 1 to 5 in the heel pattern and the girth 6 to 9 in the throat pattern represent respectively the girths of the curves 1 to 5 and 6 to 9 in the side elevation, the difference must be found between the *horizontal* and *slant* lines in both heel and throat patterns as follows:

Take the length of the horizontal line 1 to 5 in the heel pattern and set it off on the slant line 5° to 1° as shown from 5° to g. In a similar manner find the difference between the lengths of the horizontal and slant lines in the throat pattern. Take the length from 6 to 9 in the throat pattern and set it off on the slant line 6°-9° and obtain point h; g-1 then shows the difference between the horizontal and slant lines in the heel pattern and h-9° the difference between the horizontal and slant lines in the throat pattern. Midway in the side elevation draw the line A-3.

#### The Offset Front

Now take a tracing of A-3-5-6 in side elevation and trace it direct on the metal sheet as shown by A-3-5-6 in Fig. F. At right angles to A-3 in the short-cut pattern from points A and 3, draw lines making A-h equal to the difference 9°-h in the throat pattern in Fig. E and 3-g in the short-cut pattern in Fig. F equal to the difference 1°-g in the heel pattern in Fig. E. Draw a line from g to h in the short-cut pattern in Fig. F. Now take a tracing of A-9-1-3 in side elevation in Fig. E and set it as shown in Fig. F by h-9-1-g, being careful to have the line A-3 of the side elevation in Fig. E come directly on the line h-g in Fig. F.

Note the irregular break at 3-g on the heel and at A-h in the throat. Fill these breaks by drawing graceful curves from i to j on the heel and l to m in the throat. Then will 1-j-i-5-6-l-m-9-1 be the net short-cut pattern for the front of the offset.

Bisect the arc 1-4 of the heel pattern in Fig. F and obtain X from which draw lines to 6 and 9 on which slight bends are made to join to the heel and throat. If a tracing of the true geometrical pattern in Fig. E is laid over the short-cut pattern in Fig. F there will be but a slight difference in shape, which will answer practical requirements in most cases.

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STOCK SIZES AND  
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The PREMIER line of furnaces and air conditioners for 1938 has been further expanded, further improved, made even more salable. There are new models, new streamlined cabinets, a new and larger line of blowers, with new positive seal filters.

The PREMIER merchandising service for dealers has likewise been expanded and geared up to help produce more sales and greater profits for you. Valuable new advertising aids have been prepared, to tie in with a new and still more effective program of sales assistance.

Summed up, the PREMIER dealer in 1938 will enjoy all the benefits and advantages that we can give him. He will have a line that is remarkably complete . . . that ranks high in appearance, service-

ability, moderate price, and true value. He will receive *both* factory and field engineering assistance. He will have the use of our *free* prospect letter service and advertising program in cultivating his market . . . and our valuable 6% time payment plan, in financing his jobs.

And in his own sales area the PREMIER dealer has the *exclusive* rights to the PREMIER line and factory co-operation! His present profits and future success are safeguarded by our agreement not to establish any other dealership within his trading area.

It will pay YOU to look into this PREMIER proposition, and find out if your territory is unassigned. Mail the coupon.

SEE OUR EXHIBIT  
At the Fifth  
INTERNATIONAL HEATING &  
VENTILATING EXPOSITION  
Grand Central Palace  
New York  
January 24-28-1938

1938 JANUARY  
WATCH FOR AN IMPORTANT  
ANNOUNCEMENT SHORTLY AFTER  
JANUARY 1st OF A NEW OIL  
BURNING AIR CONDITIONER AT A  
NEW LOW PRICE!

## PREMIER FURNACE CO. DOWAGIAC MICHIGAN

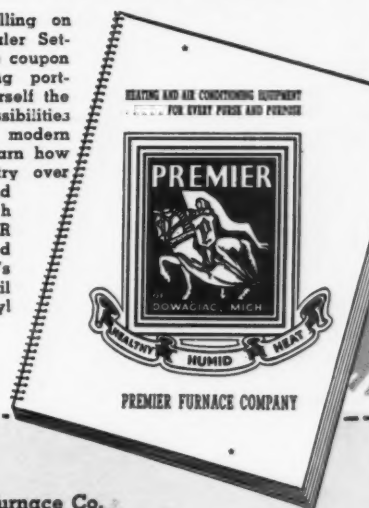
Manufacturers of Warm Air Heating and Air Conditioning Equipment

PREMIER  
*Automatik*

The 1938 PREMIER Automatik—New modernized cabinet . . . fully enclosed oil burner . . . increased filter area . . . simplified installation. A completely self-contained, centralized system . . . filters, humidifies, heats, circulates the air. Unique heat generator. Cabinet is Rock-Wool Insulated. Equipped with PREMIER Oil Burner. Two sizes with capacities up to 192,000 BTU at the bonnet—both moderately priced.

### Use Coupon! to Get this PREMIER Dealer Portfolio . .

Start the ball rolling on this PREMIER Dealer Set-up, by mailing the coupon for this interesting portfolio. See for yourself the sales and profit possibilities of this complete, modern PREMIER line. Learn how dealers the country over are prospering and progressing with the aid of PREMIER cooperation and protection. There's no obligation. Mail the coupon today!



Premier Furnace Co.  
Dowagiac, Michigan

Send me your new portfolio outlining the PREMIER plan of dealer cooperation and describing the profit possibilities of the improved PREMIER line.

Firm Name .....

By .....

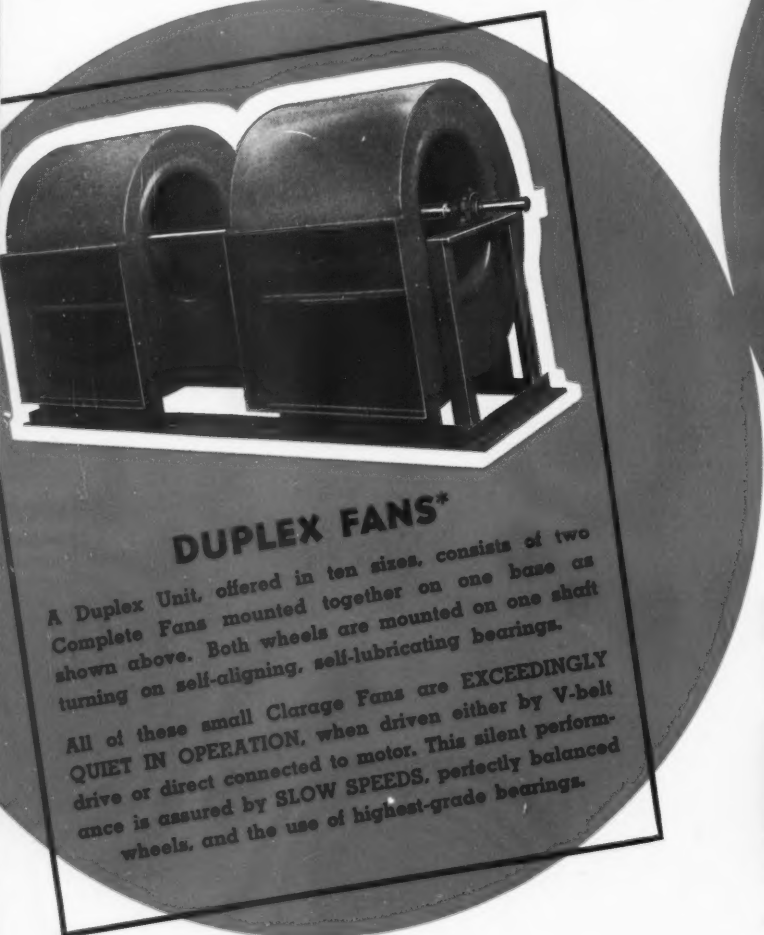
Street No. ....



# FAN WHEELS and ASSEMBLIES *for every* FORCED AIR HEATING and AIR CONDITIONING NEED

## Even in These Small Units We Maintain the Traditional Clarage Quality Standards

Furnace and air conditioning manufacturers and dealers find Clarage a dependable source of supply. This small fan equipment is backed by sound, conservative engineering, and a quarter-century of experience. It is built to the same standards of excellence which have made the larger types of Clarage air handling and conditioning products **FIRST CHOICE** of discriminating buyers the world over.



### DUPLIX FANS\*

A Duplex Unit, offered in ten sizes, consists of two Complete Fans mounted together on one base as shown above. Both wheels are mounted on one shaft turning on self-aligning, self-lubricating bearings.

All of these small Clarage Fans are **EXCEEDINGLY QUIET IN OPERATION**, when driven either by V-belt drive or direct connected to motor. This silent performance is assured by **SLOW SPEEDS**, perfectly balanced wheels, and the use of highest-grade bearings.

Write for Bulletin 32. Better still, have Clarage engineers submit a recommendation covering your particular requirements. We can make favorable deliveries on one to a thousand units.



### ANY CAPACITY—ANY SPEED\*

Clarage Wheels can be furnished in ten sizes and in a variety of widths in each size, thus meeting any capacity demand at any operating speed.

These Wheels are of the Double Multiblade Type as shown above, built with two sets of perfectly formed blades securely anchored to the center plate and rims. Each Wheel is **BOTH STATICALLY AND DYNAMICALLY BALANCED**—quiet, smooth-running and free from vibration.

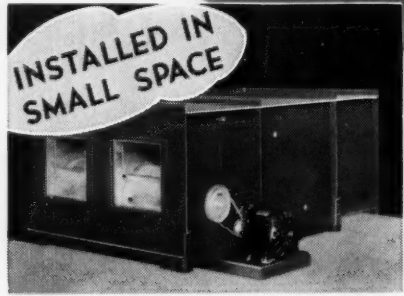
Housings, too, in any of ten sizes can be furnished separately where required.



### COMPLETE FANS\*

A Complete Fan, offered in ten different sizes, consists of a Clarage Double Multiblade Wheel, Fan Housing, Shaft, Bearings, Bearing Supports and Base. Bearings are self-aligning and self-lubricating; a bronze-graphite type which requires filling of oil reservoir but once a season. The Shaft is of liberal size to insure ample strength and rigidity.

The entire assembly is **VERY COMPACT AND TAKES EXTREMELY SMALL SPACE**. Cold air inlet boxes can be furnished as part of standard equipment.



### INSTALLED IN SMALL SPACE

Clarage Multitherms (suspended units) are ideal for retail stores, small restaurants, offices, etc. 968 different equipment combinations to give cooling, heating or complete air conditioning. Very compact; easily installed. Ask for Bulletin 107.

**COMPLETE  
AIR CONDITIONING  
•  
COOLING  
•  
VENTILATION  
•  
FACTORY HEATING  
•  
MECHANICAL DRAFT  
•  
FANS and BLOWERS  
for  
INDUSTRIAL NEEDS**

**CLARAGE FAN COMPANY** KALAMAZOO, MICH.  
SALES ENGINEERING OFFICES IN ALL PRINCIPAL CITIES



# Fort Wayne's Experience With Licensing and a Heating Code

By Charles E. Tharp

Secretary, Sheet Metal & Warm Air Heating Contractors' Assn.

SINCE publication of the Fort Wayne code began in American Artisan some months ago, requests have been received from all parts of the country for copies of the code and asking for our impressions of benefits or disadvantages.

With regard to copies of the code, we now have to advise that the last available copy was mailed some time ago and until the Fort Wayne association makes other copies available, we cannot fill requests.

Briefly, in answer to what contractors think of the code, it might be said that enthusiasm seems to increase month by month. Today there are few complaints—most of these are on trivial matters—and compliance with the specifications of the code is becoming less and less of a problem.

When the Fort Wayne code was first instituted, all contractors then engaged in warm air heating or sheet metal work or both were automatically granted a license. This was done because men cannot be legislated out of business and we knew that compliance would be a matter of catching violators. However, all installers of oil burners or stokers had to take out a license which was not required before so, today, we do not have any oil burner or stoker installations made by firms not licensed and subject to the specifications of our code.

In the past several oil companies serviced and installed oil burners—today these companies have stopped that practice unless they have in their direct employ someone holding a license to install and service burners.

Up to date there have been several examinations for oil burner and stoker license with several rejections. There has not been held, up to now, any examination for furnace or sheet metal work. The first examination will be held shortly after the first of January, 1938. Examinations to date and those coming up have consisted of written and oral questions, pertaining to very definite and non-controversial matters and to date no one has failed.

Our greatest problem up to now has been the securing of 100 per cent compliance with the specifications of the code for heating. And most of the trouble has been with design and sizing of duct work according to code specifications. Several jobs have been torn out and many revamped to conform strictly with the code, since we do not wish to allow any leeway during the first years.

We have tried to conduct schools under the guidance of our association so that those who suffer due to ignorance and not to animosity, may learn and study the purposes of the code. We do feel, now, that the time has come when ignorance can no longer be considered an excuse and enforcement becomes 100 per cent effective January 1.

There were some firms who thought the code was something to get out of and because our inspection has been handicapped by more work than one man can attend to, there have been slip ups. But when caught the penalty has been swift and positive. Jobs have been torn out and revamped at the expense of the contractor and we have had lawyers of violators recommend compliance.

We have had splendid cooperation from our appeal board which was set up as a court of last resort. The several cases brought before the board have all been decided in favor of the code with resulting expense to the violator. Also, under our code, every licensed contractor is an inspector or reporter of installations made without permit or license, and because most contractors want to see the code enforced it has been dangerous and difficult for any violator to hide his work.

Our examining board is so set up that it acts as advisor to the inspector and whenever a violator is brought in this board is prepared to tell him specifically what is wrong and just what has to be done in the future to avoid arrest.

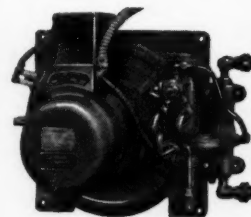
Also of great help is the clause in the code which makes it mandatory that any carrier of heating or sheet metal equipment or materials must report delivery dates and places to the authorities. This gives us a check on practically every job and to avoid compliance the violator must do his own hauling, avoid license and permit, do his work in the dark and have cooperation of the owner.

There have been few complaints from contractors who wish to see better work. Some complaint has been made of the \$25.00 license fee and some have stated that a permit for repair work is a needless expense. Of some humor were a few complaints that going to the city hall to get the permit was asking too much of the busy contractor. And we have had a few objections to design clauses in our code. These may be altered as experience points the way. As a general summary, we can say that our experience has been most favorable and support is increasing.

**"BANKHEAT" Pressure Type**

Johnson "Bankheat" Pressure-Type Burner is designed not only to burn fuel oil economically and efficiently but, when required temperatures have been reached, burner automatically shuts off. As the burner stops, counterbalanced draft shutter closes, preventing passage of cold air through the boiler, conserving fuel and lengthening life of furnace.

Type 30-AV uses up to No. 5 fuel without pre-heating. Johnson-patented viscosity compensating control valve furnishes constant flow of fuel oil to burner, regardless of fuel temperature or viscosities and without excessive pressure on lines or undue strain on pump or motor.

**TYPE 30-AV**

# JOHNSON Burners *for* 1938

PIONEERS in the manufacture of oil burning equipment, the S. T. Johnson Co. presents a complete line for 1938, including burners for every requirement for industry, commerce and home. For more than 30 years Johnson fuel oil burners have been preferred by architects, engineers and home owners for economy, durability and efficiency. From satisfied users in all parts of the world come unsolicited testimonials to the sterling worth of Johnson equipment. The Johnson name on a fuel oil burner is a warrant of value . . . it means careful engineering, accurate design and a product that will give you assured satisfaction throughout the years.

JOHNSON ENGINEERS will be glad to assist in the preparation of layouts and estimates. Worthwhile territories & Johnson franchises available to aggressive dealers anxious to serve their communities with a complete line. Write today giving full details as to qualifications.

**"SELECTAIR"**

Air-conditioning unit "SELECTAIR" combines in one compact unit every feature desired by homeowners, architects and engineers for economical heating, air-conditioning & ventilating the modern home. Year-round hot water for domestic use. Forced circulation of air for summer. Equipped with "Bankheat" Pressure-type Burner. Finished in enamel with chrome trim.

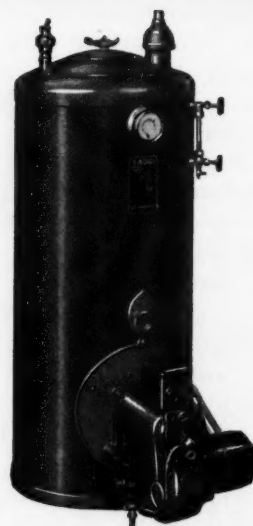
"LADDI" Du-All combination boiler-burner unit for homes, is fully automatic, odorless, quiet and trouble-free . . . furnishes heat or domestic hot water or both in combination at low cost.

SEE OUR EXHIBIT!  
**INTERNATIONAL HEATING &  
VENTILATING EXPOSITION**  
GRAND CENTRAL PALACE - NEW YORK  
January 24-28, 1938



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**"LADDI" DU-ALL**



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3. Physical and Physiological Principles of Air Conditioning
4. Air Pollution
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23. Unit Heaters, Ventilators, Air Conditioning and Cooling Units
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39. Piping and Duct Insulation
40. Electric Heating
41. Radiant Heating
42. District Heating
43. Water Supply Piping and Water Heating
44. Test Methods and Instruments
45. Terminology

## A NEW BOOK FOR EVERYONE

1. For the engineer—fundamental principles of heating, ventilating, and air conditioning; practical application of technical formulae for calculation and design.
2. For the architect—complete data for preparation of specifications; catalog of modern equipment—latest developments in apparatus and materials.
3. For the contractor—a wide range of choice in equipment and materials—what to get and where to get it. A dependable source of information for the busy man.
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More than just a theoretical treatise, not merely a mass of uncorrelated data—it embodies the results of years of scientific research, the technical training and practical experience of hundreds of men.

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Enclosed is \$5.00 for which send me as soon as ready a copy of the Heating, Ventilating, Air Conditioning Guide 1938. It is understood I may return it within 10 days, if it is not satisfactory and you will refund my remittance.

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## Important Good News for AMERICAN ARTISAN Readers



### A Complete New Line of Improved WARM AIR FURNACE SWITCHES

for Fan, Blower and Limit Control  
at Line Voltage and Low Voltage

**Y**OU can depend on the new Cook Furnace Switches for trouble-free, highly satisfactory installations. They'll help you make the job right, help keep it sold and help you get extra sales.

Important improvements make installation more simple and easy and increase the efficiency and dependability of their performance. You can sell these new Cook switches in volume with confidence that they will give your customers highly satisfactory performance.

Check up on these switches. We'll gladly send you complete information.

- No. 101 LINE VOLTAGE BLOWER SWITCH
- No. 102 LOW VOLTAGE BLOWER SWITCH
- No. 103 LINE VOLTAGE LIMIT SWITCH
- No. 104. LOW VOLTAGE LIMIT SWITCH

## COOK CONTROLS

THERMOSTATS—FURNACE LIMIT CONTROLS  
ZONE CONTROLS—BLOWER CONTROLS

## COOK ELECTRIC CO.

2671 Southport Ave.

CHICAGO

## Precalculated Engineering

(Continued from page 112)

Transmission heat loss = 650 Btu per hour  
Infiltration heat loss = 1050 Btu per hour

Total ..... 1706 Btu per hour

Taking 1700 Btu per hour as being a close enough approximation, applied to the type of wall covered by the accompanying Table No. 3 which has a transmission loss of 218.75 Btu per hour for 12.5 square feet of surface, it is evident that the amount to *add* for *each* such window to the heat loss through the wall as given by the table, will be  $1700 - 218.75 = 1481.25$  Btu per hour. This forms the basis for the allowance for windows equipped with storm sash as listed at the bottom of the table.

### Value of Weatherstrip

While as noted we have allowed no infiltration reduction to the familiar put-up-and-take-down type of storm sash, good weatherstrip (expertly applied) brings a sharp reduction in air leakage, especially in the case of poorly fitted windows.

The American Society of Heating & Ventilating Engineers recommends that for the average weatherstripped window and for a wind velocity of 15-miles per hour, a leakage of 23.6 cubic feet of air per hour be assumed for each running foot of crack. For a poorly fitted window, equipped with weatherstrip, the Society recommends the assumption of 34.1 cubic feet of air per hour per foot of crack. Experience indicates that the larger of these two values is the safer one for general use.

This is because there is not only a difference in the relative efficiencies of different types of weatherstripping, but also because careless installation by a saw and hatchet carpenter may greatly diminish the efficiency of the best weatherstrip. Furthermore, weatherstripping is often added after windows and doors in older houses have become anything but "well fitted."

For these reasons, it is recommended that the higher value, 34.1 cubic feet per hour per foot of crack, be assumed, and this is the value used in the accompanying tables for weatherstripped sash.

On this basis, the infiltration heat loss through the crack of our *standard* size of window is:

$$34.1 \times 0.075 \times 0.24 \times 70 \times 17.5 \\ = 750 \text{ Btu per hour (approx.)}$$

Adding to this, the transmission loss of 1000 Btu per hour for such a window, gives a total heat loss of 1750 Btu per hour per window with a 70 degree inside-outside temperature difference.

As previously pointed out, the transmission loss through 12.5 square feet of the type of wall for which Table 3 is compiled, is 218.75 Btu per hour for a 70-degree temperature difference.

Hence, for each weatherstripped window without storm sash, the amount to add to the transmission loss through the gross exposed wall is:

# Now—a Complete Water-Type Air-Cooling Unit:

## "GOLDEN-ROD" AIR CONDITIONER

● Offer the Golden-Rod—and you are offering the most economical and efficient COMPLETE Air-Conditioning System ever developed. Built complete with the famous Golden-Rod blower, cooling coils and filters. Rated at 3 tons, using 6 gpm 60° water and 2,200 cfm 85° return air. Suitable for 8 or 10 room homes, stores or office buildings. Automatically controlled. Provides even distribution of warm, filtered, humidified air for winter—cool, filtered, dehumidified air for summer.

Notice these specifications:

Base: 40 $\frac{1}{4}$ "x40 $\frac{1}{4}$ "

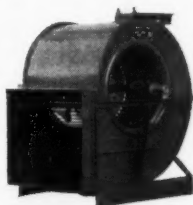
Height: 66 $\frac{1}{4}$ "

Return Opening: 32"x39"

Blower Outlet: 22"x18 $\frac{1}{2}$ "

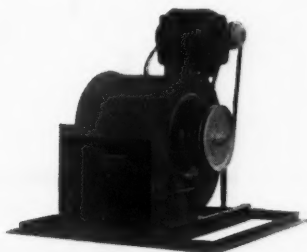
Motor:  $\frac{3}{4}$  h.p. Capacitor type

*Below are three Golden-Rod blowers, famous for silence, efficient blower wheel, durability, maximum air delivery, ease of installation and better accessibility.*



**UTILITY TYPE  
BLOWER**

General purpose blower for all heating, ventilating and cooling jobs. Top motor mounting standard equipment. With or without motor and drives. Available in singles and twins for capacities of 1,200 to 10,000 CFM.



**BASE TYPE BLOWER**

Ideal for any duct installation. Blower and motor cushion mounted on rigid angle frame, punched for duct attachment. Canvas connection not required. Capacities: 1,200 to 5,000 CFM.



**PACKAGE TYPE BLOWER**

Streamlined cabinet in green featherweave, trimmed in black with chrome handles and decorating stripes. Larger filter area. Large inspection door making all parts readily accessible. Capacities: 1,000 to 4,000 CFM.



### See Your Jobber or Write

Go to your nearest distributor at once and get complete information about any of the perfected Golden-Rod Conditioners or Blowers. Or, mail the coupon, and we will supply you with full details promptly, and name of the nearest distributor. **SEND TODAY!**

**F. JADEN MANUFACTURING CO.**  
HASTINGS, NEBR.

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F. JADEN MANUFACTURING CO.,  
Hastings, Nebr.

Please send me information about your

☐ AIR CONDITIONER ☐ BLOWERS

NAME.....

ADDRESS.....



# AEROFIN

## Heat Exchange Surface

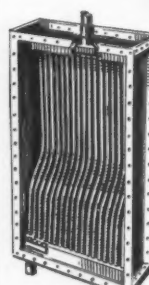
### The Vital Part OF THE HEATING AND COOLING PLAN



Universal  
AeroFin  
for  
Heating



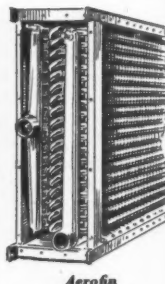
AeroFin Direct  
Expansion Unit  
Row Control



Flexitube  
AeroFin  
for  
Heating



Cleanable  
Tube Unit  
with Removable  
Header



AeroFin  
Continuous  
Tube  
Water Coil



Direct  
Expansion Unit  
with Centrifugal  
Header

**IN the heating or cooling system, everything depends on the quality and efficiency of the surface. When your plans and specifications call for AeroFin, you will be following the example of hundreds of progressive consulting engineers, architects and contractors. They have found AeroFin light weight, standardized heat exchange surface fully equal to every operating demand.**

**There is a good reason for AeroFin's fine performance. It is the product of a company devoted solely to the manufacture of heat exchange surface, designed by engineers who are close to the practical problems of heating, cooling and air conditioning.**

**Try AeroFin on your next installation. Send today for illustrated data or ask any of our district offices for such technical assistance as you may need.**

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Chicago • Detroit • New York • Philadelphia • Dallas • Atlanta

$$1750 - 218.75 = 1531.25 \text{ Btu per hour.}$$

This expressed in thousands of Btu per hour is the heat loss per window at the bottom of Table No. 3 for single windows weatherstripped.

Values for similar windows in walls which have other transmission coefficients are determined in the same manner.

If a window is weatherstripped and protected by storm sash, then the total heat loss will be made up of the transmission loss of 656 for storm sash, plus 750 Btu per hour infiltration loss, making a total of 1406 Btu per hour.

A sufficiently close approximation is 1400 Btu per hour and the amount to be added to the transmission loss through the gross wall will be, for each such window,  $1400 - 218.75 = 1181.25$  Btu per hour. This is the value used in the accompanying Table No. 3 as basis for the amount to be added to allow for losses due to windows protected by both storm sash and weatherstrip.

Assuming that the average outside door is 3-ft. wide by 7-ft. high, its area, 21 square feet, is 68 per cent greater than that of a 2.5-ft. by 5-ft. window and

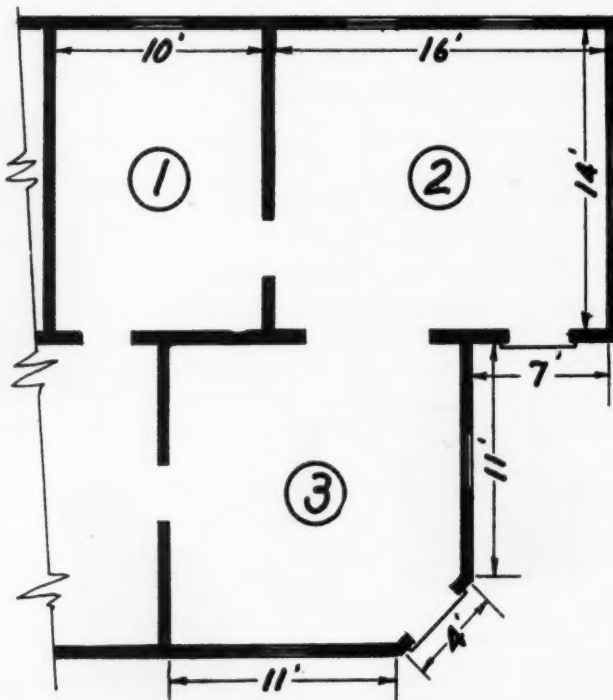


Fig. 3—Layout for a problem.

assuming that the rate of transmission through such a door is the same as through glass, the heat transmission loss for each outside door will likewise be 68 per cent greater than through the standard window. The door has 20 running feet of crack, 14.3 per cent more than the window. Although neither the area nor the crackage of the door is double that of the window, observation and experience indicate that, for practical purposes, it is both safe and conservative to take for granted that an outside door is responsible for twice as much heat loss from a room as two standard windows.

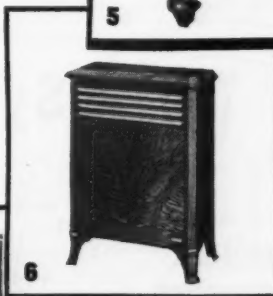
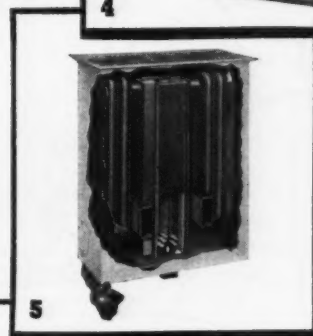
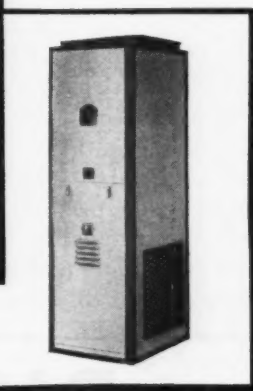
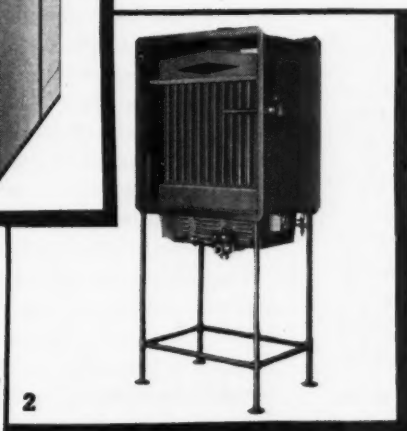
Hence, in this suggested tabular method we count each such door as equivalent to two standard windows. If a room has 4 standard such windows and one

(Continued on page 157)

# WHEN YOU SELL *Pacific* YOUR CUSTOMERS

## ARE YOUR BEST SALESMEN

Every time you sell a Pacific heating system, you make a friend for life. Your customers become enthusiastic boosters for your product, going out of their way to tell friends and associates. You profit accordingly by constantly widening your circle of satisfied customers.



## *Pacific* MANUFACTURES A COMPLETE LINE OF GAS HEATING APPLIANCES

### 1. PACIFIC STREAMLINE DELUXE

Completely automatic forced-air heating and ventilating. Streamline casing furnished in attractive crackle finish with chromium trim. All controls completely enclosed.

### 2. PACIFIC DUCT UNIT

Designed for duct work on commercial, industrial and residential installations. Capacities from 55,000 to 300,000 BTU. Can be coordinated with summer cooling equipment to give year 'round air conditioning.

### 3. PACIFIC FORCED-AIR UNIT

Winter heating and summer ventilating in one compact, highly efficient unit. No basement required.

### 4. PACIFIC GRAVITY FURNACE

The basement type of warm air furnace is one of the most popular in the Pacific line. Thousands in successful use for many years.

### 5. PACIFIC FLOOR FURNACE

Circulates fresh warm air to every corner, giving even temperature so necessary for health and well-being. Eliminates damp, sweaty walls. Operates with extreme economy because of Pacific's famous Multi-Tubular Burner.

### 6. PACIFIC THERMOLATOR

One of the most efficient room heaters ever devised. Exclusive cast iron heating element "holds heat" longer. Vented and unvented types.

### 7. PACIFIC RADIANT HEATER

Pacific manufactures a wide variety of radiant heaters, both wall and portable types. Individual burner units permanently adjusted at the factory.

Get acquainted with the Pacific complete line of gas heating appliances now, — find out how you can

increase your profit and cut down service costs. Write today for catalog AA138, describing the complete Pacific line.

## PACIFIC GAS RADIATOR COMPANY

Manufacturers Of The Most Complete Line Of Gas Heating Appliances In The West

1740 WEST WASHINGTON BLVD. • LOS ANGELES, CALIFORNIA

## Condensation in Walls and Attics

(Continued from page 119)

for wood sheathing and because of its lighter structure it offers more resistance to heat loss than a similar thickness of wood. It may be used either with or without other insulation. When used with other insulation the methods of protection suggested should be followed. When no other insulation is used the need of a moisture barrier is much less, just as with wood sheathing.

Many materials embodying the principle of reflective insulation are in use but opportunity for observation and tests has been limited. One type having metal foil attached to both sides of a heavy sheet of paper is very resistant to vapor and another type composed of a strong paper faced on both sides with metal oxides is also very effective in resisting vapor transmission. Data upon the comparative vapor resistance of these papers and many other materials are to appear in a forthcoming article.

The practice of installing insulation in existing houses, some of which have been built for many years, is becoming general, adding both to summer and winter comfort of the occupants. The occurrence of moisture or condensation in these older houses after insulation is quite uncommon, largely because such houses are not so tight as new houses, windows fit less snugly and probably have no

weather strips. Under such conditions the normal humidity is lower.

Occasionally, however, these older homes will also show evidence of moisture accumulation and generally when the occupant has made an effort to increase the humidity above normal. Some of the companies that insulate existing houses take off a portion of the outer wall covering and cut a large number of openings in the sheathing through which the insulation is blown and replace the outer covering without filling the holes in the sheathing. These openings allow more or less ventilation and should be helpful in allowing vapor to escape outward. Some companies include some form of attic or roof ventilation as part of their contract.

Positive protection for existing buildings that have a moisture problem or where it is proposed to install winter air conditioning may require some type of barrier on the interior face of exterior walls and on the ceilings below the roof. Ordinary paints of the flat wall, or lead and oil types do not seem to offer the resistance desired, but two coats of aluminum paint appear to offer excellent resistance and permit almost any subsequent method of decoration desired.

The question sometimes arises as to the possibility of summer cooling causing condensation in walls. This is very unlikely because the inside temperatures are seldom more than 15 degrees below outside temperatures so that the possibility of condensation would only occur during periods of extremely high humidity outside. Such a condition



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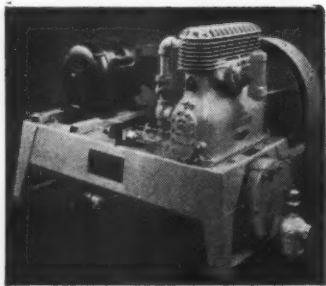
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would be of rather short duration and would be unimportant.

#### General Recommendations

For new construction it is recommended that a suitable vapor barrier be installed on the side wall studs and below the ceiling insulation and that some attic ventilation also be provided. This will not only protect the house for normal humidities but should prove ample protection in case winter air conditioning is installed. Further, it offers protection during the construction period, particularly if plastering is done in cold weather.

For existing houses that have been or are to be insulated, and where humidities during cold weather are low, attic ventilation alone should be adequate. Should evidence of moisture appear in mild weather following a cold period, cut off all possible sources of humidity for the balance of the winter and some time later in the following summer, after the moisture has had time to disappear, coat the exterior walls and the ceiling below the roof insulation with two coats of aluminum paint after which redecorate as desired.

For existing houses that are equipped for winter air conditioning follow the foregoing suggestions and during periods when outside temperatures are below 15° F. carry relative humidities not higher than 30 per cent and in sub-zero weather reduce to 20 per cent relative humidity.

### Precalculated Engineering

(Continued from page 154)

3-ft. by 7-ft. outside door, they will be equivalent to  $4 + 2 = 6$  windows.

A brief example of the use of Table No. 3 as applied to room No. 2 of the accompanying Fig. 3 is as follows:

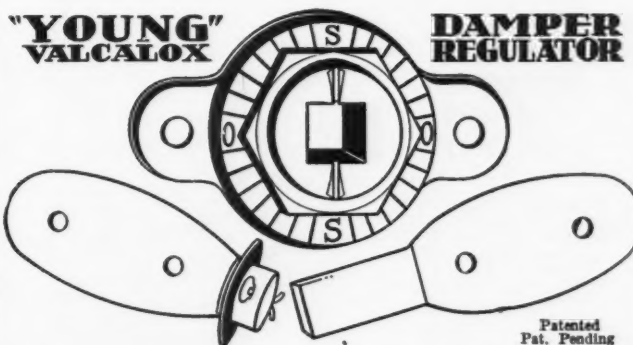
Outside walls assumed to be construction No. 1 as listed at top of Table No. 3; ceiling height 9 feet; windows 2½-ft. wide by 5-ft. high without storm sash or weatherstrip; no cold floor or cold ceiling.

The room has 37 running feet of exposed wall and the table shows that the loss through 37 running feet of such wall with 9-foot ceiling is 5.8 (meaning 5800 Btu per hour). Counting one outside door as equivalent to two windows, the room has  $4 + 2 = 6$  equivalent windows and the table shows that the additional heat loss through 6 such windows is 10.8 (or 10,800 Btu per hour). Hence the total heat loss of the room is  $5.8 + 10.8 = 16.6$  or 16,600 Btu per hour.

The next article will give a more detailed explanation of the use of the tables together with a suggested form of data sheet to simplify their use. A table will also be given for heat losses through cold ceilings of several types and for a number of additional types of outside wall construction.

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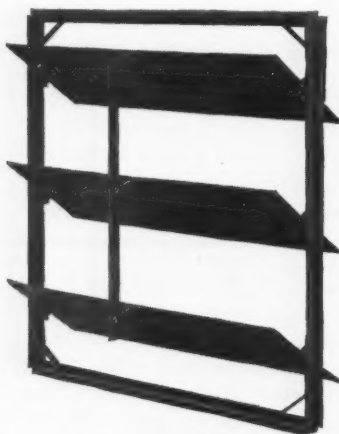
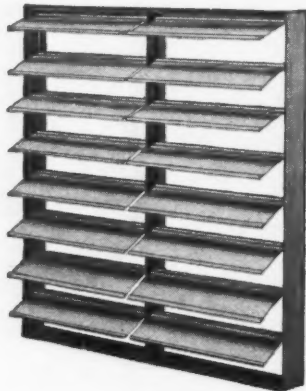
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## What is Humidity?

(Continued from page 121)

in two ways. Considered from the heat standpoint, the vapor contains more heat than that just required to vaporize it, hence it is superheated. Considered from the volume standpoint, the vapor has less weight, or smaller number of particles of moisture, in each unit of space than at the saturation point hence it is only partly saturated and the condition is known as 50% or 30% or some other per cent relative humidity.

As an example, air and water vapor are entering a structure at 32F in what we consider a saturated condition, that is any addition of moisture or a lowering of temperature will result in condensation. In this state one pound of the mixture occupies  $12\frac{1}{2}$  cubic feet of space and is, by weight, 562 parts air and 2.1 parts water vapor. Now if air at 70F and saturated vapor could be injected into a room from a humidifier, one pound of this mixture would occupy  $13\frac{3}{4}$  cubic feet of space and would be made up of 512 parts of air and 8 parts vapor by weight. By heating the 32 F. mixture up to 70 F., it would expand to nearly  $13\frac{3}{4}$  cubic feet and would contain only the original 2.1 parts water vapor now at 70 F. The vapor is therefore occupying more than its allotted space, is some 38 degrees hotter than saturation temperature and is therefore superheated. It is not generally realized that most of the time we are breathing superheated steam!

It has been stated earlier that the particles of vapor are many times their own diameter apart, in fact the material itself occupies very, very little of

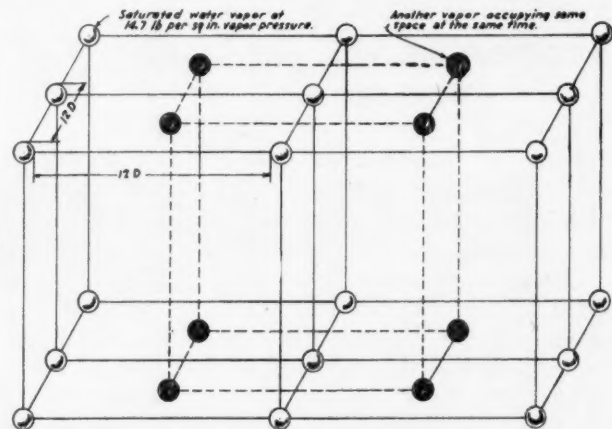
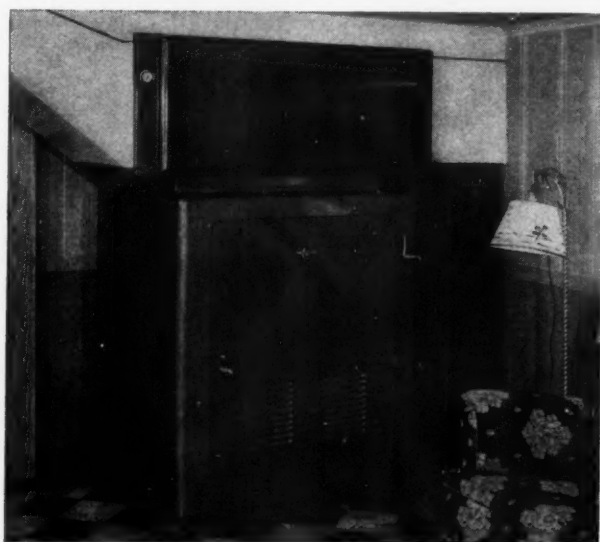


Fig. 2.

The distance apart of the particles of ice in Fig. 1 is increased when the ice is changed to vapor. The relationship in increased space between particles is illustrated here. Also, here we have two vapors in the "same space."

the space. It is not unusual, then, to find that vapor and air occupy the same space without interference. This is actually what happens in our atmosphere. We should therefore correct our habit of speaking of "saturated air" or "air as 50% relative humidity" merely because the air and the water vapor occupy the same space at the same time. Since the particles are vibrating at a speed commensurate with the

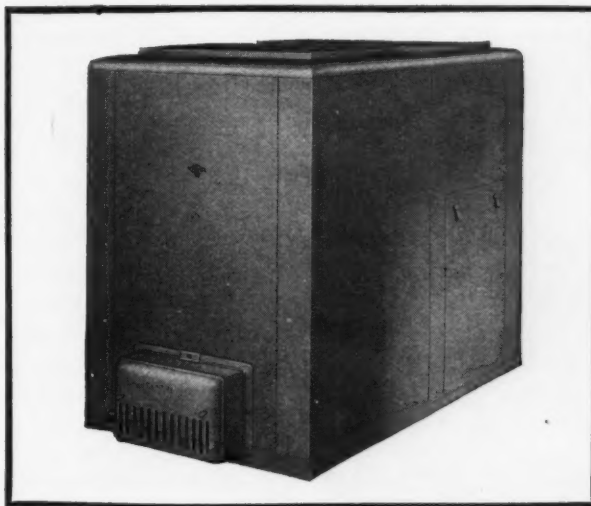
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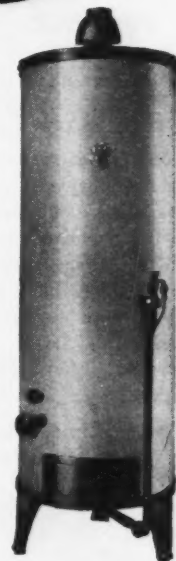


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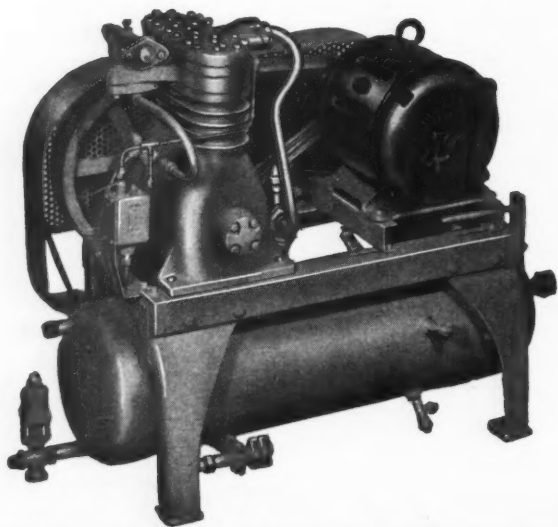


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thing we call temperature, vapor particles collide with oxygen, nitrogen and other particles bringing them all to a common temperature or velocity. The two series of particles in Fig. 2, one illustrated by a circle and the other by a centered circle, represent two vapors in the same space. It is easy to see that several vapors might be injected into the same volume.

The thing we know as pressure results from the rate at which these particles bombard or hit the container or, if not a container, any other surface adjacent to the material. This sensation of pressure on a surface is easily recognized as the pressure against one's hand when held out the window of a moving vehicle or in the delivery stream of a fan or pump. We do not ordinarily sense this pressure under usual conditions because it is equal in all directions and causes us no discomfort.

A pressure gauge, on the other hand, is merely a device with an area exposed to one pressure or bombardment on one side and a different pressure (usually that of the atmosphere) on the other with a mechanism for indicating the difference in the effect. The greater the number of particles within a space, then, the higher the pressure due to that particular vapor. This is also well indicated by the difference in force to keep one's hand in an air stream and a denser water stream. Also the greater the number of particles of any kind the greater the total pressure. Note that each different material exerts a pressure of its own and the thing we measure or speak of as barometric pressure is the sum of the pressures exerted by all the different materials in the atmosphere.

#### **Air In, Vapor Out**

Particles of dust or pollen or, anything but vapors (being infinitely large compared with air or vapor particles and many times less in numbers, on account of their size and absence of resilience, do not act to increase the total pressure as another vapor and would, probably, tend to slightly lower it.

As one illustration, let us take the condition of a residence in winter time. Due to a wind, we may have a higher total pressure outside the walls than inside. The atmosphere then will leak in through cracks and openings. We allow for such "infiltration" in our heat loss calculations. However, due to some type of humidifying apparatus, each cubic foot of space inside may contain a greater number of particles of vapor than the space outside. The vapor pressure will be greater inside, therefore, and we have the very puzzling situation of air leaking in and moisture leaking out through the same wall at the same time.

Answering the question expounded at the outset, it is clear that humidity is not only moisture, but moisture to which at least enough heat has been added to keep its condition a vapor. It is obvious that it is neither a part of the air nor carried by the air, as a sponge carries water, but merely occupies a place in the same vicinity as that occupied by air much the same as different individuals occupy spaces at a convention, or a "Fair."

**Konzo-Pressure  
Loss Tables***(Continued from page 126)*

a sharp elbow. In most cases the most vulnerable part of an elbow from the standpoint of pressure losses is the inside radius. It is more essential that the inner corner be smoothed off than it is for the outer wall to be rounded.

**15. Tee Connections**

Rounded tee connections have only one-sixth as much resistance as right-angled tee connections.

**16. Y-Branch Connection**

Y-Branch connections should preferably be made with a small angle between the branch and the main trunk. Y-branch connections made with a 90° take-off have much greater resistances than do take-offs of the proper type.

**17. Abrupt Contraction****18. Abrupt Expansion**

Abrupt changes in section are conducive to pressure losses and hence should be avoided, if possible.

**19. Gradual Contraction**

Gradual contractions introduce a negligible friction loss.

**20. Gradual Expansion**

Losses in duct sections having gradual expansion are of considerable magnitude, particularly for slopes greater than 10 per cent. Much can be done in design of modern equipment to reduce losses due to expansion. A common application of this type is the connection from the fan to the casing. The data shown in cases 20 and 22 are not entirely in agreement. The work being done by Kratz and Fellows (to be published) should clarify some of the factors.

**21-22. Pipe and Plenum Chamber**

The examples shown are quite similar to the usual duct connection to the bonnet. A slight tapered connection will materially reduce the entrance losses into the duct.

**23. Rounded Orifice**

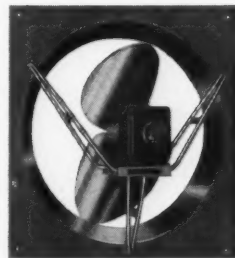
Rounded orifice connections do not involve much friction loss, and may be used where the costs of such construction can be justified.

**24. Converging Nozzle**

Converging nozzles have small pressure losses.

**25-26. Plate Orifice**

Plate orifices have unusually high resistance to

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air flow and should not be used unless conditions require such construction. Smooth orifice openings, such as case 23, require much less pressure for the delivery of air.

### 27. Diverging Section

The losses are least in diverging sections when the angle of divergence,  $\alpha$ , is approximately 3 to 4 degrees. Larger angles have much greater losses due to the creation of eddies and turbulent flow conditions.

### 28. Re-entrant Pipe

Entry losses are quite substantial in magnitude for a re-entrant pipe.

### 29. Flush Entry

The entry loss in a flush entry is about half that for a re-entrant pipe.

### 30. Cave Entrance

Streamlining or gradual changes in the entry section cause smaller entry losses.

### 31-32. Flared and Bell-Mouth Entry

Entry losses are insignificant when rounded entries are used.

### Combinations of Elbows

The data given in Figs. 1 to 6 are for single elbows or fittings. However, as stated by Madison and Parker, "The influence of the first elbow may help or hinder that of the second elbow depending on the conditions of flow produced at the discharge of the first." In other words when the airstream enters an elbow or other type of fitting with an irregular velocity gradient, that deviates considerably from that ordinarily met with, the pressure loss of that elbow or fitting will be different from the values shown in Figs. 1 to 6. Madison and Parker observed that in some cases where one 90-degree elbow followed another, that the combined losses were 25% greater than the sum of the two 90-degree elbows. The losses were particularly high in those cases where the air stream was banked in such a manner that the high velocity air stream was thrown against the sharp inside corner of a 90-degree elbow.

### Radius Ratio and Curve Ratio

The experimental data on pressure loss in duct fittings are frequently presented in terms of the radius ratio, the inner radius ratio, or the curve ratio. The differences in the three terms are shown in Fig. 9.

These data which, in the judgment of the writer, are the best available at present, cover most of the



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Table of Equivalents

Curve Ratio $R_1/R_0$	Radius Ratio $R/w$	Inner Radius Ratio $R_1/w$
0	0.500	0
0.1	0.611	0.111
0.2	0.750	0.250
0.3	0.929	0.429
0.4	1.167	0.667
0.5	1.500	1.000
0.6	2.000	1.500
0.7	2.833	2.333
0.8	4.500	4.000
0.9	9.500	9.000
1.0	Infinity	Infinity

cases commonly in use in sheet metal and duct installations. The data being assembled now by various investigators may in the future modify some of the data presented in these figures. Also, it is

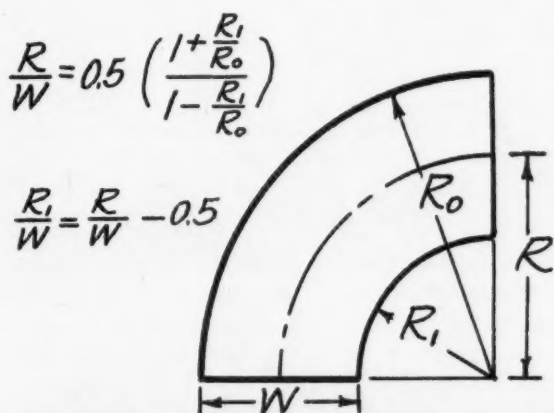


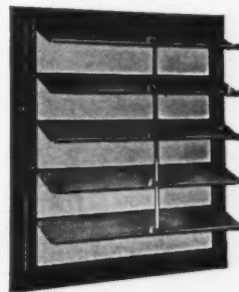
Fig. 9—Showing the relationships (and where measurements are made) of radius ratio, inner radius ratio and curve ratio.

most probable that additional and substantiating data will be assembled in the future on duct fittings, complex changes in sections, and damper fittings. For more complete explanations of each of the cases, the reader should refer to the original sources as indicated in Figs. 1 to 6 and which are tabulated in the Bibliography.

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## ELGO AUTOMATIC SHUTTERS



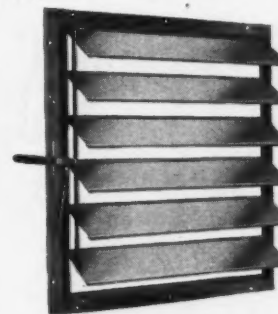
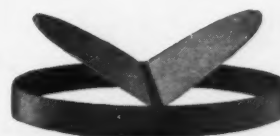
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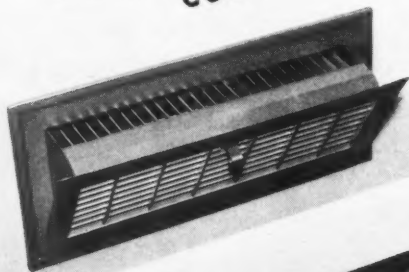
The Automatic Stack Damper, "Erie Type" is installed inside stacks used for exhaust and prevents down drafts when fan or blower is not operating.



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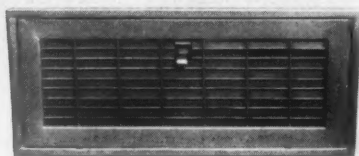
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WINTER  
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## Furnace vs. Attic Fans

(Continued from page 135)

utilized as a suction duct for pulling outdoor air through the rooms below. The head of the stairway was sealed off with a door and a partition, and the fan was mounted in the partition over the stair

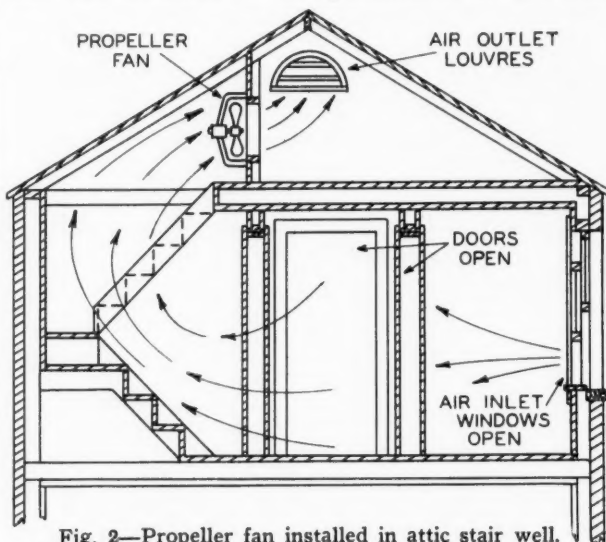


Fig. 2—Propeller fan installed in attic stair well.

well. Fig. 3 shows a propeller fan mounted in an existing attic window, and the path of air flow through an existing scuttle-hole leading into the attic is indicated by arrow heads. Ceiling grilles can be placed in the second floor bedrooms and the distribution of air equalized by varying the effective area of each grille to suit the volume of the room to be ventilated. This method, of course, places the attic under suction and our experience indicates that about 20 per cent of the air handled by the fan will be air that has been short circuited through leaks in the attic, or, in other words, only 80 per cent of the fan capacity is effective for ventilating the rooms below. Still a third method is to install a fan chamber or box over a centrally located ceiling grille, preferably in the ceiling of a central hall, and then mount the fan in the attic in the side of this box, sucking air into the box and discharging it into the attic where it finds its way to the outdoors

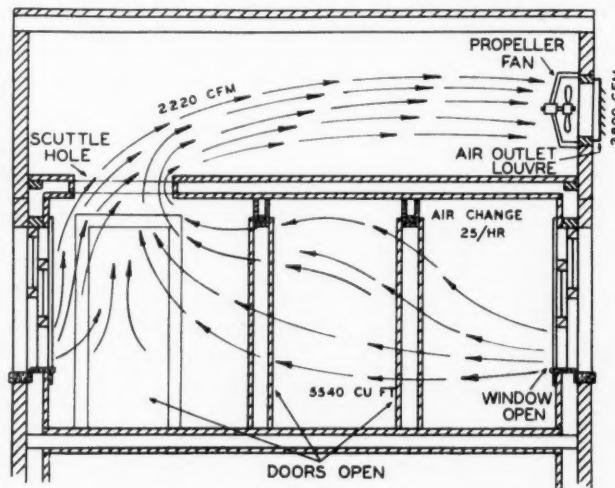
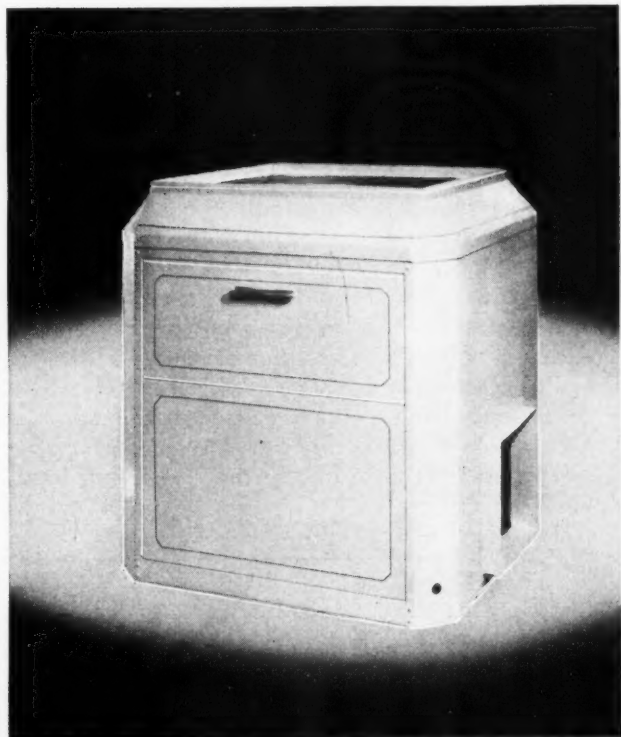


Fig. 3—Attic fan—residence.

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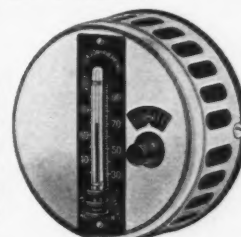
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through open attic windows. In such installations the attic window openings should be quite liberal so that the fan capacity is not reduced by a building up of static pressure on the discharge side of the fan.

#### Fan Capacities Required

As the attic fan depends entirely for its cooling power upon its ability to draw very large quantities of outdoor air through the rooms, it is very important that sufficient air handling capacity be provided. Both our experience here in Detroit and the tests made at the University of Illinois indicate that the attic fan must have a capacity sufficient to circulate at least ten air changes per hour if effective cooling is to be accomplished, and the best results are obtained when the fan circulates 30 to 35 changes of air per hour through the rooms to be cooled. Measured in terms of cfm of capacity, this means that an ordinary three bedroom house,

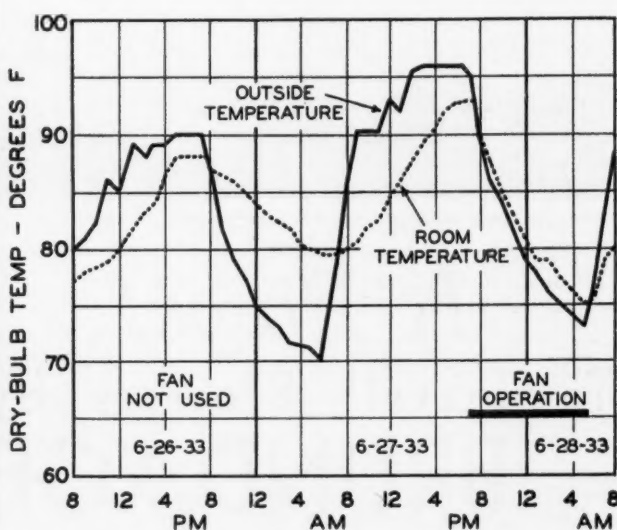


Fig. 4—Effect of attic fan ventilation upon the temperature of an upstairs room.

with a second floor cubage of 5,000 to 6,000, would require a fan with a capacity of 3,000 cfm. Our Detroit experience indicates that the home occupant will not be entirely satisfied with less than 30 air changes per hour, based on one floor only. Some manufacturers recommend as high as 40 to 60 air changes per hour, but an examination of curves showing the cooling effectiveness plotted against the number of air changes per hour indicates that there is no appreciable gain resulting from more than 35 air changes per hour and, of course, the investment cost is correspondingly higher for the larger capacities.

#### Cooling Effect

Outdoor temperatures become favorable for attic fan operation at about seven to eight p. m. in the evening, and if the fan has been designed and mounted in such a manner that the operating noise is not objectionable, it is advantageous to operate

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all night or for a period of twelve hours. Tests at the Illinois Research Residence indicated that, in spite of the favorable "stack effect" enjoyed by this residence, the attic fan did a somewhat better cooling job than was accomplished by full natural ventilation. Our tests on Detroit residences showed that an attic fan circulating 30 air changes per hour was about twice as effective as was cooling with full natural ventilation. Fig. 4 shows the effect of attic fan ventilation upon the temperature of an upstairs room. In this particular installation, air was drawn through a ceiling grille at a rate of about 36 air changes per hour. It will be seen that the inside temperature can be made to follow the

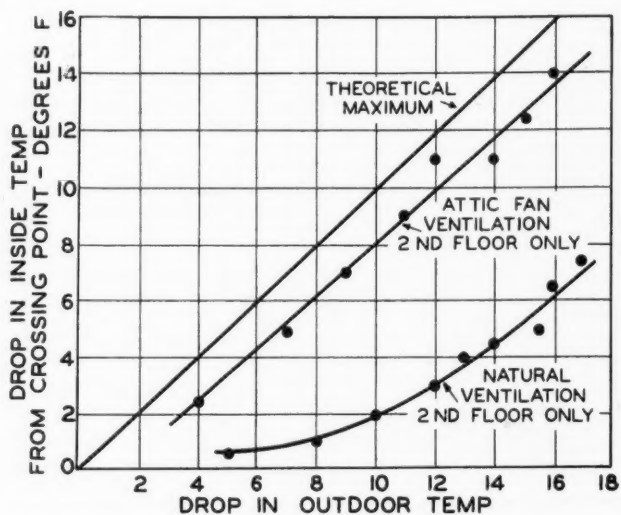
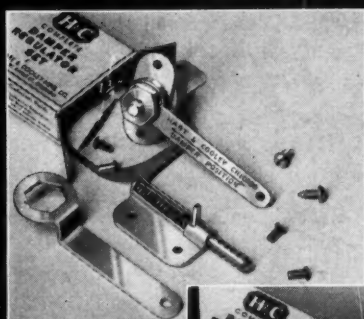


Fig. 5—Relation between inside and outside temperature drop.

declining outdoor temperature very closely, the indoor temperature at midnight being only about two degrees above that of outdoors. This is in contrast to the condition existing when the fan was not used, as the curves show the indoor temperature to be at least eight degrees higher than outdoor temperature at midnight, and additional temperature records show this difference to have been as high as twelve degrees on some occasions. Fig. 5 shows more effectively the efficiency of cooling\* at an air change rate of 36 per hour. The indoor and outdoor temperature drops, as indicated in Fig. 4, have been plotted at one hour intervals between the point at which the two temperature curves cross and the point at which the drop is a maximum. It will be noted from the figure that attic fan ventilation produced a uniform drop in indoor temperature which was only two degrees less than the theoretical maximum, while natural ventilation produced a very slow drop in indoor temperature during the early evening hours. Comfort, however, is not measured by the dry bulb temperature alone, as air movement also plays an important part. Kathetermometer tests indicate that the circulation of 30 to 35 changes of air per hour will result in air

\*Calculated as suggested by Professor A. P. Kratz and S. Konzo, Engineering Experiment Station, University of Illinois.



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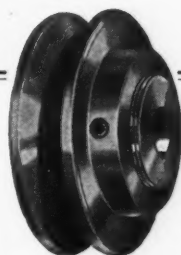
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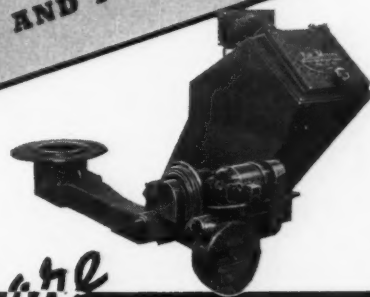
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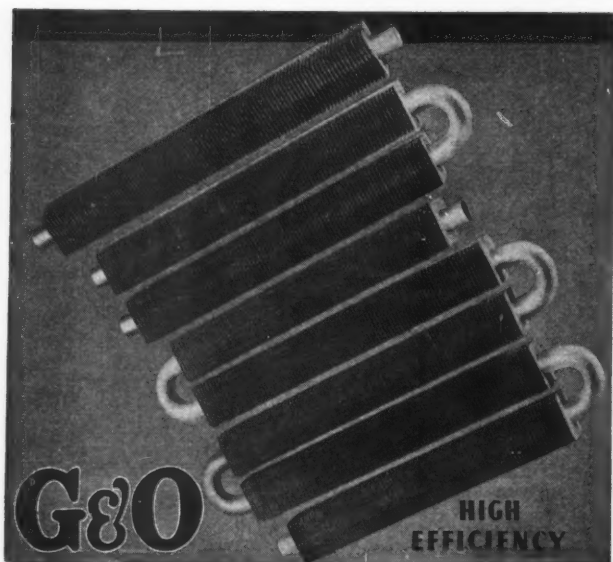


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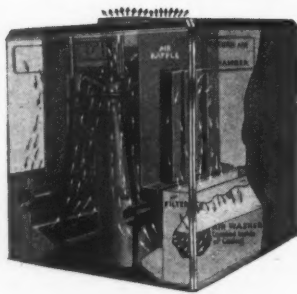
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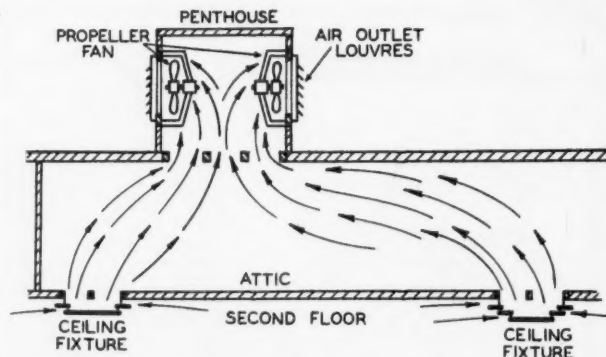


Fig. 6—Attic fan—Mount Clemens office, Mount Clemens, Michigan. (Installation).

velocities as high as 50 fpm in certain parts of the room. This air movement alone is sufficient to reduce the effective temperature by an additional one degree, and this is equivalent to a reduction of an additional two degrees in dry bulb temperature.

The attic ventilating fan can also be used to advantage in cooling the top floor of small commercial offices. Our company installed two 30-inch propeller fans in a specially constructed penthouse located over the second floor of its commercial office in Mount Clemens, Michigan. Fig. 6 shows the manner in which these fans were actually installed. These two fans had a combined capacity of 13,000 cfm, sufficient to circulate about 14 changes of air per hour. Fig. 7 shows a set of temperature curves for this installation and indicates that it is possible to bring the room temperature down to within about seven degrees of the outdoor temperature with this rate of air change.

### Effect on Need for Artificial Cooling

Tests at the Illinois Research Residence indicate that the circulation of about 17 air changes per hour for the entire residence reduces the operating hours of an artificial cooling system by about 15 per cent when compared to full natural ventilation.

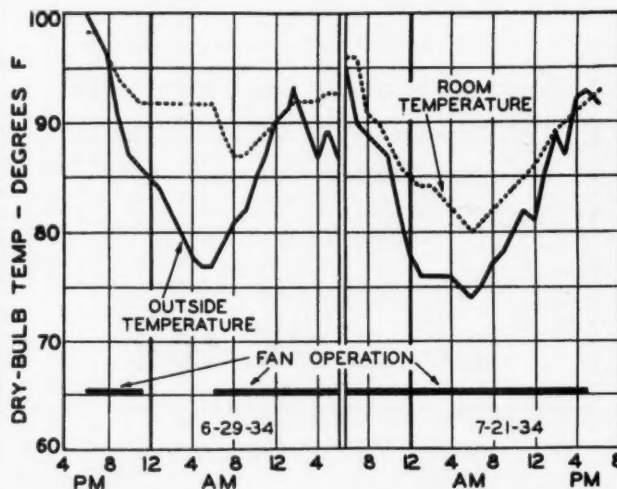


Fig. 7—Attic fan—Mount Clemens office, Mount Clemens, Michigan. (Temperature curves).

There is some objection, however, to keeping downstairs windows open all night and, if the ventilation is confined to the second floor only, the saving in the cooling hours required the following day would be considerably less than the 15 per cent just mentioned. The use of the attic fan does not reduce the size of the refrigerating machine required for cooling, and consequently the saving in operating cost hardly justifies the additional investment and complication involved in using the attic fan as a supplement to artificial cooling.

#### Ventilation of Attic with Attic Fan

The question has frequently arisen as to whether the operation of an attic fan during the daytime, to circulate large volumes of air through the attic, would result in any reduction in bedroom temperatures in the evening. Tests at the Illinois Research Residence indicate that there is no appreciable lowering of the temperature of the surface of the bedroom ceilings, or of the air in the bedroom, when the fan is operated in this manner. This can be partially explained by the fact that a good share of the heat entering the bedroom ceilings is transmitted by radiation from the hot roof surfaces. These tests indicate that the cost of operating an attic fan throughout the daytime hours is quite unwarranted, when measured in terms of any possible improvement to temperature conditions on the second floor.

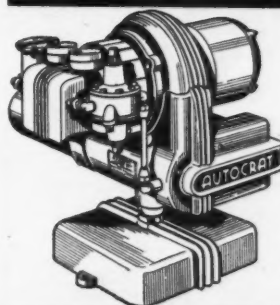
#### Operating Cost

The attic fans installed in the Detroit area ranged in size from 20 inches to 30 inches in diameter. A typical installation of a 24-inch propeller fan had an actual capacity, by field test, of 4,040 cfm. The hours of use in this area have averaged about 500 for the season, and the power input about 350 watts for a one-fourth horsepower motor. On this basis the electrical energy consumption averages about 175 Kw-hrs. per season. At a cost of two and one-fourth cents per Kw-hr., the season's operating cost is about \$4.00, which has been the actual average for our experimental installations. In Illinois this figure would probably be doubled because the warmer climate requires more frequent use of the fan. It is evident that the operating cost of attic fans, even where used quite liberally, will be so low as to make it of only minor importance to those who can afford the first cost. Comfort cooling by means of attic fans can be accomplished more cheaply than by any other mechanical means now available.

#### Experimental Installations

Table III shows a summary of the design and operating data for five experimental attic fan installations made in the Detroit area by The Detroit Edison Company. (See page 134.)

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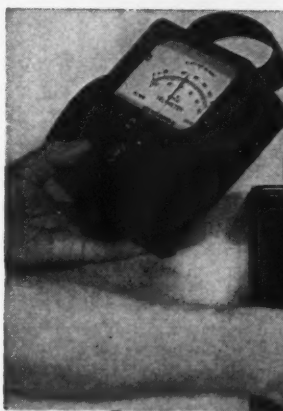
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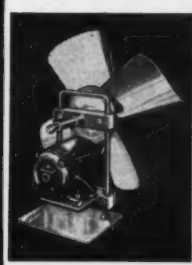
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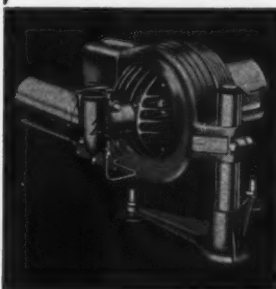


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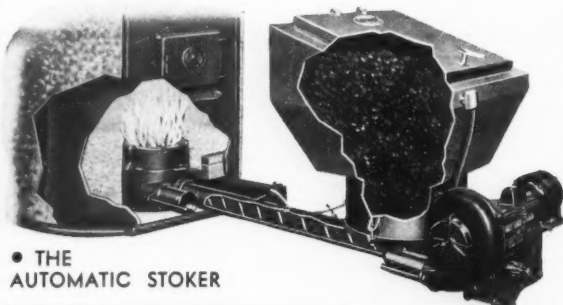
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1.—A furnace fan of the capacity usually installed (capable of circulating four to six air changes per hour) has some value for night air cooling for residences which have little or no "flue effect," and especially when there is no appreciable movement of air outdoors.

2.—A furnace fan should have a capacity of about nine air changes per hour if appreciable cooling is to be accomplished. Full natural ventilation under favorable conditions, induced by "flue effect" of the structure or by a breeze outdoors, is usually more effective than the furnace fan.

3.—The furnace fan, large enough to cool effectively, has an advantage over the attic fan in that most, if not all, of the investment cost is properly chargeable to heating, while the attic fan can only be used during the comparatively short cooling season.

4.—The furnace fan also enjoys the advantage of circulating filtered air, but this advantage must be paid for in restricted capacity or higher electric energy cost.

5.—Recirculation of air by a furnace fan does not improve comfort conditions by more than one degree of effective temperature.

6.—Cooling with a furnace fan by pulling air through the basement and recirculating is limited to short periods of time, as the temperatures of basement and rooms tend to equalize. Circulating air through a basement frequently results in excessive dampness due to condensation on cold walls and pipes.

7.—An attic fan circulating 30 to 35 air changes per hour through the second floor rooms is very effective for night air cooling and this size is as large as can be economically justified. The gain from circulating more than 35 air changes per hour is very small.

8.—Ventilating an attic by using the attic fan to circulate air through it in the daytime does not appreciably reduce the temperatures of the rooms below.

9.—An attic fan circulating about 17 air changes per hour through the entire house may be expected to reduce the cost of artificial cooling by about 15 per cent when compared to full natural ventilation.

10.—Circulating about 30 air changes per hour through the second floor rooms only is decidedly more effective than natural ventilation through the same window openings, and the indoor temperature for the second floor can be brought down to within two degrees of the outdoor temperature.

11.—Effective night air cooling by an attic fan cannot be accomplished by circulating less than nine or ten air changes per hour.

12.—The electric energy cost for operating an attic fan is about one-third as much as that required for a furnace fan when accomplishing an equivalent cooling effect.

13.—The attic fan is the simplest and cheapest device now available for making second floor rooms of residences more comfortable on summer nights.

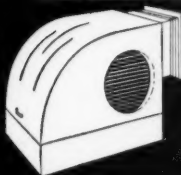
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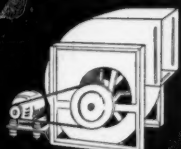
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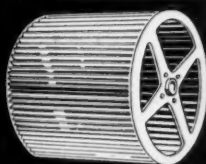
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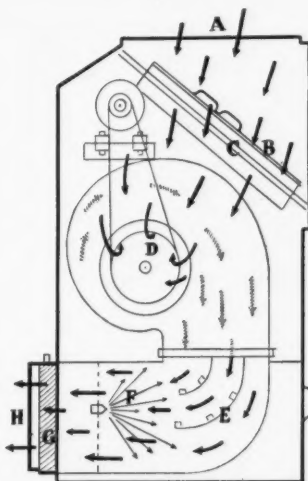


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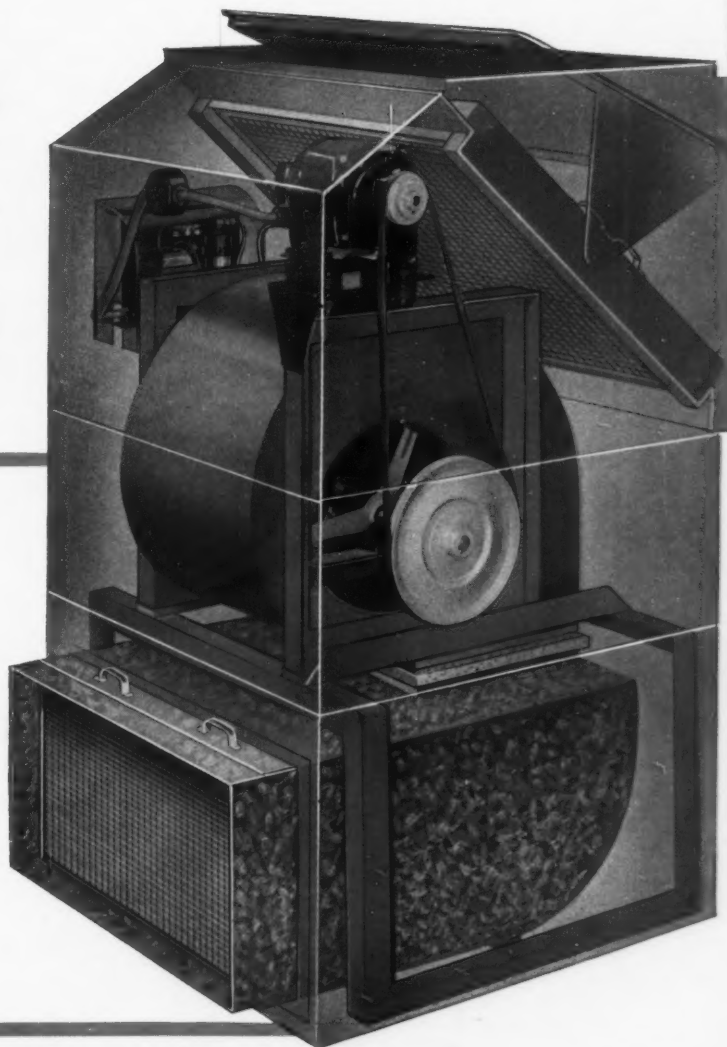
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**FURNACE** *with*  
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Hall-Neal VICTOR dealers have a COMPLETE LINE of warm air heating equipment—headed up with an outstanding—modern—air conditioned heating plant that has since 1890, been a standard for excellence and high efficiency in every community where sold.

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The VICTORAIRE Furnaces are line leaders that will build bigger sales in your community, too. In beautiful, enamel-finish cabinet casings—either the oil-burner or the coal, coke or gas burner can be installed with quiet, dependable Victor air-conditioning Blowers to give reliable, automatic heating and winter air conditioning.

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The cutaway illustration above shows how VICTOR fin-radiation furnaces have the heating unit completely surrounded with patented, exclusive, heat-radiating fins which so greatly increase heating efficiency that fuel costs are considerably reduced.

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Note above the waist-high shaker handle, automatic radiator-damper control lever, large water pan correctly placed above feed door and extra large ash pit door which makes it easy to remove ashes from back of ash pit.

**HALL-NEAL FURNACE COMPANY**

1324 N. CAPITOL AVENUE

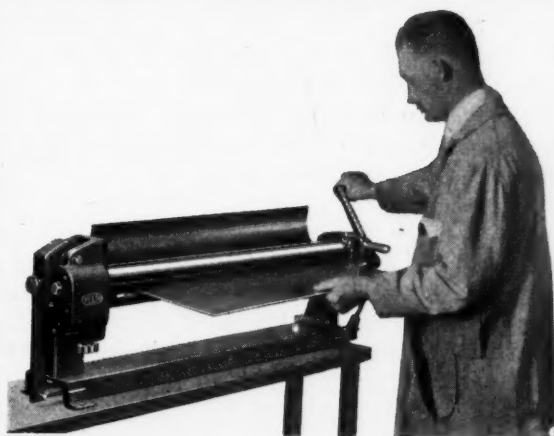
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Preferred by the experienced sheet metal worker for cylindrical forming operations — simple in design, ruggedly built and easily operated.

TILTING UPPER ROLL controlled by hand lever locks automatically in raised position to permit instant removal of formed cylinder. Rolls need not be STOPPED when lifting, since compensating gears are in constant mesh and WILL NOT BIND, a particularly desirable feature on machines when arranged for power drive. MACHINE CUT SOLID STEEL GEARS are totally enclosed. Smoothly finished ground steel rolls have grooves for forming work previously wired. AMPLE ADJUSTMENT is provided to prevent closing of seam locks when forming cylinders.

Pexto Forming Machines are available in a wide range of sizes and capacities for bench or floor installation, manual, belt or direct motor drive, to meet every requirement of the modern sheet metal shop. Their speed and accuracy will help you to cut costs while improving the quality of your work.

Remember too, that PEXTO—Pioneer maker of sheet metal working machines and tools—today offers an unusually complete line of quality equipment for performing every operation in sheet metal fabrication in the most approved and efficient manner. Write us for bulletins and complete details.

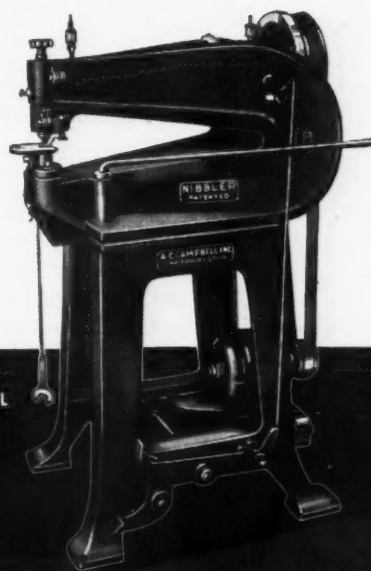
THE PECK, STOW & WILCOX COMPANY

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CAMPBELL  
NIBBLER  
NO. 1-B



# SPEED

## when CAMPBELL NIBBLERS cut irregular shapes

Because of their speed Campbell Nibbling Machines often bring savings of 100% to 500% in time or cost. They cut irregular shapes in steel or other commercial materials up to one-half inch thick more quickly and economically than can be done by any other method.

Campbell Nibbling Machines eliminate the cost of dies for short runs. Invaluable in tool rooms, experimental departments and for many production purposes. They do not distort materials, set up internal strains or cause invisible fractures. They leave no burrs. Edges require little or no finishing.

Write for complete information.



ANDREW C. CAMPBELL DIVISION  
AMERICAN CHAIN & CABLE COMPANY, Inc.  
DESIGNERS AND BUILDERS OF SPECIAL MACHINERY  
BRIDGEPORT, CONNECTICUT

*In Business for Your Safety*

# CAMPBELL Material Cutting MACHINES

## 1937's Largest Copper Roof

(Continued from Page 46)

placed in the walls of the monitor. There were ten such louvres, each measuring 14 feet 6 inches long by 7 feet high. These louvres are used for exhausting the foul air from the building and are connected to ten large blowers in the monitor. The curved ends of the walls of the monitor are paneled as are shown in Fig. 7 and the spaces between the louvres are shaped to resemble louvres.

The general appearance of the monitor has added to the beauty of the roof and at the same time provided the necessary space required for ventilation.

At the entrances to this structure there are two large and elaborate marquise with paneled ceilings, all made of copper and four small entrances treated likewise.

One of the interesting phases of the contract was the procedure adopted to estimate the quantity of materials and labor involved. This estimate was also a specification of quantities, condensed into sheet requirements, so that when the contract was awarded it was only necessary to make out the order for the material involved.

In estimating the labor required to apply this material, due consideration was given to the magnitude of the areas to be covered. It was realized that to apply standing-seam roofing on such an area, in the usual old-time method would require more time than was allotted for the completion of this build-

ing. It was decided that the old hand method would be far too slow and costly, especially when it is remembered that the sheets for the main roof were made from 20 inch wide by 48 inch long plates.

It was decided that inasmuch as the roof was mechanically divided into 140 small areas, it would be best to treat the problem as a series of small roofs rather than one large area and devise ways and means to cope with the situation from that angle. This method simplified the quantity take-off and labor problem, but still there was the volume of areas to be covered on one roof.

Manual labor to apply and seam 1,000 squares of copper roofing is a big problem to any sheet metal concern. The following methods were decided upon:

First, because the work was to be performed approximately eighty-four miles from our plant in New Orleans and about five miles from our branch in Baton Rouge, it would be most practical to erect a field shop on the grounds where the building was to be erected.

This shop was equipped with all machines required for this class of work. This afforded us the opportunity of shipping direct from the mill all materials as required for the contract.

As mentioned before, the sheets used for the main roof were 20 inches by 48 inches. These sheets were ordered this size direct from the mill, the total quantity being 11,125 sheets. These sheets were specially notched by machine in the shop, and were

## Register Satisfaction WITH Rock Island



When you install Rock Island Registers or Air Faces you have the satisfaction of knowing that you are putting in material of sound design and lasting beauty. You will find them easy to install, and that they will be entirely satisfactory to your customers.



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## NU DRY FURNACE CEMENT

NuDry Furnace Cement is ideal for winter jobs and prevents smoking joints.

NuDry is best because it comes to you in dry form, takes less material to set a furnace, DOES NOT CRACK, POWDER OR BLOAT WHEN FURNACE IS FIRED IMMEDIATELY AFTER APPLIED, will not shrink, keeps

joints tight at all times, withstands high temperatures, and is not affected by temperature changes. It will not harden in containers and generally requires only half the usual amount of cement to complete a job.

Check the following jobbers and furnace manufacturers for your nearest supply of NuDry.

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Baltimore, Md.  
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J. M. & L. A. Osborn Co.  
Minet Heating Supply Co.

Canton, Ohio.  
Grant Totten, Inc.  
McCurdy Furnace & Fdry. Co.

Chicago, Ill.  
M. Brucker  
Northwestern Stove & Repair Co.

Cincinnati, Ohio.  
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Cleveland, Ohio.  
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### NO. 1 HEAVY DUTY PUNCH

Length 34", weight 22 lbs., well distributed to nicely balance the tool. Capacity  $\frac{3}{8}$ " hole through  $\frac{1}{4}$ " iron. Heavily reinforced for strains. Punches and dies  $\frac{1}{8}$ " to  $\frac{1}{4}$ " by  $\frac{1}{4}$ ". Insertable Pipe Handles.



### CHANNEL IRON PUNCH

Every part of this Punch is interchangeable with the No. 2. Length 23", weight 16½ lbs. Depth of throat 1½". Capacity  $\frac{1}{4}$ " through  $\frac{1}{4}$ " iron. Punches and dies  $\frac{1}{8}$ " to  $\frac{1}{4}$ " by  $\frac{1}{4}$ ".



### NO. 6 FLANGE PUNCH

Punches within  $\frac{3}{8}$ " of inside corner of Angle Iron. Capacity  $\frac{1}{4}$ " through  $\frac{1}{8}$ " iron. Depth of throat 1½". Throat opening width  $\frac{1}{2}$ " above die top. Punches and dies  $\frac{1}{8}$ " to  $\frac{1}{4}$ " by  $\frac{1}{4}$ ". Especially adapted for Button Punching. Weight—10 lbs.

### Channel Iron

2½" Flange x ¼" Web.



### NO. 91 BENCH PUNCH

Capacity  $\frac{1}{8}$ " hole through  $\frac{1}{4}$ " iron.  $\frac{3}{8}$ " hole through  $\frac{1}{8}$ " iron. 2" hole through  $\frac{1}{8}$ " iron. Weight 82 lbs. Depth of throat 5". Stock size of punches and dies  $\frac{1}{8}$ " to 2".



### EXTRA PUNCHES and DIES

Prompt shipments can be made of any size or any quantity of both types of extra punches and dies as here shown.



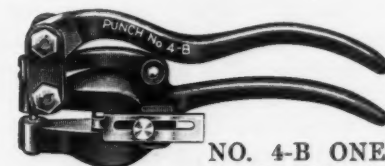
### Angle Iron

2½" x 2½" x ¼".



### NO. 2 PUNCH

Length 23". Capacity  $\frac{1}{8}$ " through  $\frac{1}{4}$ " iron, weight 13 lbs., depth of throat 1½". Punches and dies  $\frac{1}{8}$ " to  $\frac{1}{4}$ " by  $\frac{1}{4}$ ".



### NO. 4-B ONE HAND PUNCH

Length 8½". Capacity  $\frac{1}{4}$ " through 16 gauge iron. Weight 3 lbs. Depth of throat 2". Punches and dies  $\frac{1}{8}$ " to  $\frac{1}{4}$ " by  $\frac{1}{4}$ ".



### NO. 8-B PUNCH

Capacity  $\frac{1}{4}$ " hole through  $\frac{1}{4}$ " iron. Length 18½", weight 7½ lbs. Depth of throat 2". Stock size of punches  $\frac{1}{8}$ " to  $\frac{1}{4}$ " by  $\frac{1}{4}$ ".



## THE EASY EDGER

A FLANGING MACHINE THAT FLANGES IN—

CAPACITY  
20 GAUGE  
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ONE  
OPERATION  
TURNS  
RIGHT ANGLE  
FLANGES  
ON  
CURVED  
STRAIGHT  
OR  
IRREGULAR  
FITTINGS

FOR EVERY  
SHEET METAL  
HEATING  
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AIR CONDITION-  
ING SHOP

NOTE—WILL TURN ONE HEIGHT FLANGE ONLY ( $\frac{3}{8}$ )

MORE SIMPLE  
THAN A  
BURRING MACHINE

NO GAUGES  
TO  
ADJUST

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UNIFORM EDGES

WRITE FOR DETAILS

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CHICAGO ILLINOIS

See Our Advertisement on Page 81

## BRILLION



### ONE PIECE RADIATOR FURNACE SERIES 600

With each succeeding year, an increasing number of furnace men all over the nation who know heating are turning to

Brillion. The Brillion 600 is unquestionably the "buy" of the year for up-to-date dealers. A big, heavy, warm air furnace that can be depended on to stand up and deliver consistent heating service under the most exacting conditions. Built for long, hard service from heavy castings made the Brillion Way. Easily fired, easily regulated, easily managed. A furnace that will stand up year after year giving its user plenty of heat at low fuel cost. Write today for further information. A post card will be sufficient.

**BRILLION FURNACE CO.**  
BRILLION WISCONSIN

provided with double lock edges on each end of the 20 inch width by a machine in the shop. These individual sheets were then ready to install, but had they been locked in rolls on the ground it would have been necessary to turn the standing seams on the roof by means of tongs or kickers, thereby requiring more manual labor and a possibility of unevenness of heights, which would have caused considerable trouble in double seaming.

We therefore decided to notch and form the double lock joint in our field shop and assemble the correct number of sheets required to form a complete course from one lateral joint to another, on the floor of the monitor. After this procedure, we would then have a section of sheets 26 feet long by 20 inches wide, with no standing seams.

In our machine shop at New Orleans, we devised a machine that would allow us to enter these 26 foot long strips of copper into the rolls and by electric power the sheet would pass over the rolls, automatically forming both standing seams, insur-

*Removable strainer made of 20 oz. copper,  $\frac{1}{2}$ " mesh screen, top and sides. 9" dia.*

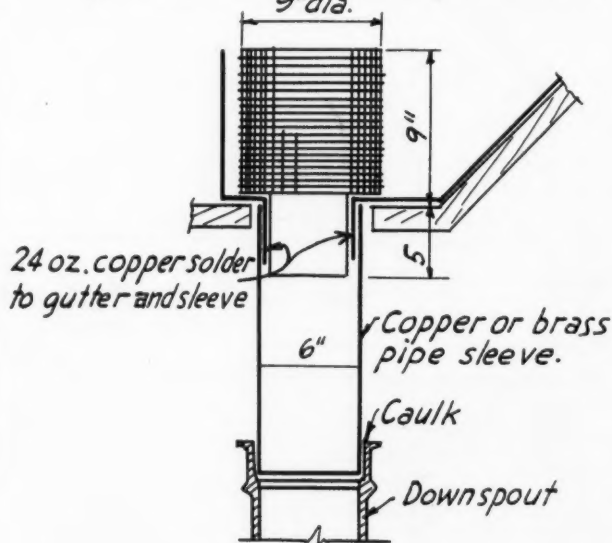


Fig. 5 DOWNSPOUT HEAD.

ing accuracy in width of each panel and height of seam. These sheets were then ready to be applied to the roof. The completed sheets were then moved from the monitor to their respective panels by the mechanics who were designated to the respective bays.

Before the application of any copper roofing, the entire roof was covered with one layer of 25 lb. asphalt felt.

The next problem was to have the sheets or courses lined perfectly, vertically and horizontally. This was accomplished by our engineering department from the ground by instruments, giving us the various points on the rafter run to properly space each section between the ribs; after which this space was divided and lined so that each course of sheets would fit directly into its respective space.

It was then noted that the specification called for

the roofing to be cleated every 10 inches. This required 60,000 cleats. To have cut, notched and formed this quantity of cleats by hand would have been a tedious job, so we made a die in our New Orleans shop, which at one stroke cut, notched, punched, and formed each cleat. These were then shipped to the job and each cleat was fastened with two copper nails.

There still remained two important problems before this roof could be started:—First, was the problem of double seaming, and second, the problem of the lateral offsets which were continuous around the roof; each section being higher than the preceding one, as noted in Fig. 8.

Inasmuch as the offset was formed on a wood base, it was necessary that they be installed after the sections of roofing were laid; however, as mentioned above, these lateral lines were established first. Our course lengths were determined in advance, but it being our intention to double seam this roof by other means than hand, it became necessary that the wood offset be placed in position after the sections were laid. Therefore, the following method was used. The entire section between the ribs and from the valley was laid and cleated in place, and the offset was formed by means of tongs, giving us a vertical section  $1\frac{1}{2}$  inches high. We then made a steel forming stake the required height of the offset and folded over this the amount of material that was to be the lock edge.

This, however, was not done until all of the top butts had been double seamed.

To double seam this roof, we made two special machines, electrically operated; one of which formed the single seam, the other formed the double seam. These machines moved on adjustable and flexible wheels to compensate for any excess height in the standing seam where the sectional double locks occurred. It was therefore, possible to continue panel after panel without any great difficulty or manual labor, proving to our satisfaction that by proper planning, copper roofing can be installed economically.

After all roofing was installed, the entire surface was washed and treated with a coating of specially treated oil.

The material required in this contract consisted of approximately 140,000 pounds of copper.

The roof sheets were of one pass cold rolled copper, which gave a pleasing bright finish and when treated with the special oil stood out in the sunlight like a golden crown.

The entire roof work was completed in forty-five working days. This was about fifteen days before our allotted time, and just in time for the first semi-annual Rodeo to be held at the university.

The field superintendent in charge of construction was Jos. Spano.

The outstanding achievement of the Holzer Company in making this largest copper roof installed in 1937 an example of workmanship and economy in application has been highly commended by the leading sheet metal firms in the South, who have seen and admired the finished work.

## FASTER CLEANER WORK ON THE JOB with a Chicago Steel Portable Brake



A real time and actual money saver . . . that's the Chicago Portable Brake! No going back to the shop to bend this or flatten that . . . do it right on the job! Just check over its capacity and you'll see why we call it the best brake buy on the market. Bends and flattens  $\frac{1}{4}$ " or wider seams on 22 ga.—bends  $\frac{1}{2}$ " flange on 20 ga.



legs are hinged for convenience in carrying . . . Clamping handles are used for carrying. Legs lock with a simple twist of a thumb-screw . . . and it can be had in two sizes. 49 and 61 in. bending lengths . . . 62 and 74 in. overall lengths. Weighs only 320 or 370 lbs. depending on size.

Write for full details. A money-maker for every job.

Size	Code	Bending Length	Capacity	Overall Length	Net Weight	Shipping Weight	Price f. o. b. Chgo.
420	Odluw	49 in.	20 ga.	62 in.	320 lbs.	355 lbs.	\$105.00
520	Oduct	61 in.	20 ga.	74 in.	360 lbs.	400 lbs.	\$110.00

Both sizes—Overall width 24". Overall height folded 28", set up 44".

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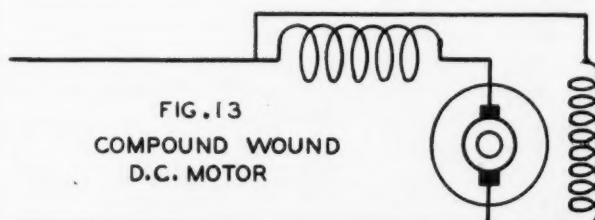
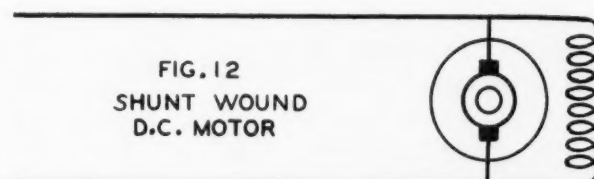
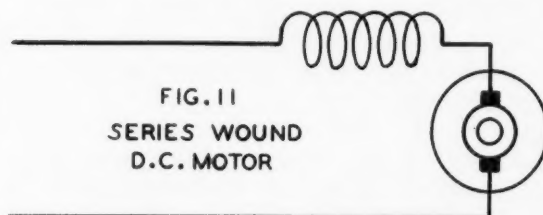
**411 N. SEVENTH ST.**  
**ST. LOUIS, MO.**

## Motors in Air Conditioning

(Continued from page 140)

together one after the other. A diagrammatic illustration of this construction is shown in Fig. 11.

This type of construction is not ordinarily used in air-conditioning work as we shall explain later.



*B. Shunt Wound DC Motor.*

In this type of construction, illustrated by Fig. 12, the current divides—part of it going through the armature or rotating element and another part going through the field. This motor has some advantages for certain applications but likewise has disadvantages as a general purpose motor.

*C. Compound Wound DC Motor.*

The compound wound direct current motor is a combination of the series winding and the shunt winding applied to the same motor. This is the type of motor most generally used on the equipment found in an air-conditioning installation. The method of feeding current to the motor is shown by Fig. 13.

### Coming Conventions

Jan. 19-20—Illinois Sheet Metal Contractors. Annual Convention. Peoria, Illinois.

Jan. 21-22—Sheet Metal and Warm Air Heating Contractors' Association of Indiana. Convention and Exhibit. LaSalle Hotel, South Bend, Indiana.

Feb. 7-9—Master Sheet Metal, Heating, Ventilating and Air Conditioning Contractors Association, Inc. of Wisconsin. 24th Annual. Republican Hotel, Milwaukee. Paul L. Biersach, secretary.

Mar. 1-3—Michigan Sheet Metal & Roofing Contractors' Assn. Annual Convention. Durant Hotel, Flint, Michigan.

Mar. 7-9—New York State Sheet Metal, Roofing & Air Conditioning Contractors' Association, Inc. Annual Convention. Buffalo, N. Y.





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SURE CURE FOR THAT  
**COLD ROOM  
PROBLEM!**



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**Floor  
Type \$7.50**

**Wall  
Type \$10.00**

NOW'S the time to make those "Cold Rooms" pay you a handsome extra profit. Victor Heat Boosters are just what you need to do the job and do it quickly. It takes only 3 minutes to install a Victor Booster in either floor or wall type registers. Then, the powerful fan pulls out the cold air "cork" and the heat comes up in a hurry to make the room warm and cozy. A demonstration will sell anybody and, what's more, every installation leads to many new customers as each user likes to tell his friends about how he solved his "cold-room" problem. Remember, four out of five homes have at least one cold room, so get busy now and get your share of the extra profits that are waiting for the furnace men who sell Victor Heat Boosters. Ask your jobber or write us for complete details on prices and discounts, today!

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Ornamental Perforations are used in Architectural Grilles, Radiator Enclosures, Metal Furniture, Cabinets, Stoves, etc. In addition to the standard shapes we have many exclusive and attractive designs suitable for different uses.

H&K workmanship is unsurpassed.  
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**ONE-PIECE ORNAMENTAL LEADER STRAPS**  
"Rival" and "Fitrite" 1-piece ornamental leader straps are made in 6 styles. Pat. July 10, '28; Jan. 6, '31.



**"RIVAL"** **"FITRITE"**

ZINC straps for GALVANIZED or ZINC pipe, cost very little and greatly improve the appearance of the job. They satisfy customers and are a good advertisement for the contractor using them. COPPER straps are made for COPPER pipe. Sold through jobbers only. Send for free sample and folder.

<b>"FITRITE" ROOF STRAINERS</b> 5" to 12" Square 3 Types Bronze and Iron	<b>"FITRITE" BRONZE BEEHIVE STRAINERS</b> 3", 4", 5", 6", 7", 8" Round Also 3" x 4" Square
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<b>"FITRITE" Adjustable Swing Chimney Jack Frame</b> Five sizes in One For 6", 7", 8", 9", 10" Pipe.	<b>"FITRITE" SKYLIGHT GEARING</b> Iron or Bronze 3/4", 1/2" and 1" sizes. Made also for chain operation.
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<b>ADJUSTABLE PIPE SNOW GUARDS</b> Pat. Sept. 5, 1933 <b>"FITRITE"</b> Galvanized Iron or Bronze	<b>"PROTECTOR"</b> For smaller roofs New or Old Lead Shield
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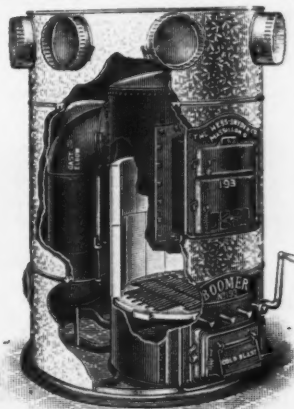



Write Dept. "A" for full details and prices. Tel.: CHelsea 3-2400

**DAVID LEVOW** 308 WEST 20th ST. NEW YORK

## BOOMER STEEL FURNACES

THE New, Modern and Advanced Boomer Steel Furnace is now ready for 1938. Built as always of the finest materials and including all the many improvements that have been developed by us during the past 50 years, it is without a doubt the most salable ever



offered the heating industry. Boomer Furnaces have "Customer Appeal" for the prospective buyer can readily detect the many superior features in construction and operation that will mean savings for him. Boomer furnaces sell and you can sell them. Write for complete information on the steel as well as the Cast Iron Boomer line of furnaces. They will make money for you.

**THE HESS-SNYDER CO.**  
MASSILLON, OHIO

## Arc Welding

(Continued from Page 53)

Having considered the various joints from the standpoint of meeting requirements of least cost for preparation and welding, the next thing to consider is the accessibility for welding. In general, work should be designed to permit welding in the position offering least hindrance to the operator. Flat position is preferred, vertical or overhead second and horizontal last. This does not mean, however, that welds of high quality can not be made in the last mentioned positions as they are made regularly. They are, however, somewhat more difficult to make than flat, vertical or overhead and therefore should be avoided where the design permits.

Further regarding accessibility, work should be arranged so that a minimum of welding need be done in confined corners or other restricted locations. In some instances, it may be necessary to weld joints inside. An example might be the manufacture of steel cabinets, the requirement being to put the welds where they do not show rather than make them on the outside where grinding and polishing would be necessary. This procedure would eliminate grinding and finishing costs. However, in such instances, the cost of grinding and finishing should be weighed against the somewhat slower welding speed of making inside corner welds, particularly, when the welding is in overhead position.

Another point about accessibility for welding—and this applies particularly in duct work installations—is the importance of leaving as little welding as possible for erection. The duct work should be fabricated in as long lengths as possible so that the only welding needed during erection is joining the pre-fabricated sections together. Also, the work should be laid out to avoid making a contortionist of the welding operator. Welds can be made even where it is necessary to bend the electrode to reach around a corner, but such work should be avoided, except as a last resort.

The important point to remember about placing welds is to locate all joints and lay out all work so that the welding can be done readily and with minimum work, both as regards to actual welding and incidental handling, machining, etc. Keeping this always in mind will be reflected in highest quality work and lowest cost.

The question of machining after welding also should receive consideration. In some of the finer grades of work, welds are ground down and polished so as to be unnoticeable. However, if appearance is not of greatest importance, the machining after welding can be little or none. Here also, the rule should be to meet requirements at least cost. It would be uneconomical for instance, to machine, to a mirror finish, welds which never meet the eye.

Accompanying Figs. 6, 7, 8 and 9 show products are welded of sheet metal.

Part II of this article will discuss "How to Tell a Good Weld."

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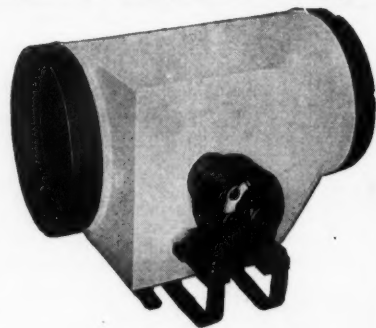
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 MADISON AVE. AT 43RD ST., N. Y.  
 Adjoining Grand Central

## Philadelphia Shop Records

(Continued from Page 57)

the year, January 1, 1936, before a single job is completed or an estimate sent. Also to a failure to determine the amount to be added for overhead expense to **each** bill, which when added together from each and every bill for the year, would cover the expense for the year.

The same kind of money is used to pay overhead as is used to pay for material and labor. If it is impossible to find the amount of overhead for the year, before the beginning of the year in any business two year old or over, then there is plenty of reason why a shop can "guess away" all or part of its profit. A weekly list of expenses, kept accurately and balanced each week, at the end of each month or year gives the total amount of expense at any time during the year. Any shop owner who has the stubs in his check book and a book for cash received, may figure out how much he spent for everything connected with the business during a year. Then if he will deduct the amount of money spent for material, productive labor (which is the amount paid the men who worked on the jobs during the year and which he charged on the bills paid by his customers) and deduct any amount paid for tools or other equipment that has a continuous value for several or more years; the balance will represent the amount he must add to the bills, beside the cost of material and productive labor, before he can realize any profit.

Experience shows this is true because most shops do not regularly do business to their full capacity and with a little extra expense as much as 50 per cent more business can be handled.

An examination of the expense items in the jobbing shops and even in some manufacturing shops will show the largest items of expense are the same in bad or good years.

### From Bankruptcy to Solvency

It may be interesting to follow through the statement of shop No. 5 whose experience from near bankruptcy to solvency simply by the use of their office facts and a strict application of the method described.

Prior to 1927, a girl attended to the office details under the supervision of the owner, and because of the volume of business done there was always sufficient money, with the assistance of some outside sources at times. During 1927, however, there was a tightening of finances, which caused the owner to ask the assistance of an accountant.

The accountant was accustomed to dealing with departments in the manufacturing business and a distribution of costs based and laid on many operations so he made the mistake of trying to adapt this method to a comparatively small business. The result was that neither the owner or office girl, who

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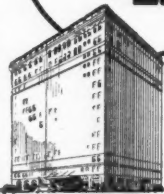
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Manager

ST. LOUIS

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was studying bookkeeping at a local school, understood the system, but the facts revealed losses during several previous years. Matters became worse and finally the owner visited one of his creditors and asked his advice. The creditor advised the owner to call in Mr. Ritter and have him make a detailed report. This was early 1930.

With the aid of the girl in the office, who readily understood the simple method proposed and immediately saw its purpose, a profit was shown by the end of 1930, the same year, and every year since even during the depression, viz:—

	Total Sales	Profit	Loss
1928 .....	\$30,670.26		\$1,670.28
1929 .....	21,257.62		2,100.00
1930 .....	25,808.78	\$ 511.18	
1931 .....	22,692.72	1,505.02	
1932 .....	21,423.83	814.90	
1933 .....	33,423.40	3,283.48	
1936 .....	30,864.60	1,782.76	

By 1932 the office girl had a good grasp of the situation and kept accurate account of every dollar spent, particularly the distribution of the expense. 1934 and 1935 also showed a profit, although not shown here. This young girl after assuming charge of the billing and checking the estimates, did not have an easy job in preventing the boss and the men from running off the track at times, but with the proof in figures each week and month she now is the "last word" in this shop between loss and profit, and the shop is in excellent shape. The profit for 1936 should have been larger than 1935, but the owner made several thousand dollars repairs and improvements to the property and shop.

### Covering Overhead Brings Profits

The statement designated No. 8 illustrates how a shop owner who, prior to three years ago had been doing approximately the same amount of business each year, started really to cover his overhead expense and make some profit. The profit was small in 1933; a little larger in 1934; larger in 1935 and the statement shows what happened in 1936. Prior to 1933 and extending back to 1928, he was very much discouraged by the loss each year and did not understand what was wrong. This year, 1937, by checking up on his expense each month, he will make a better showing than in 1936 and without very much increase in business.

Naturally, the proper control and distribution of costs, alone will not produce a profitable business. There are other vital matters that need constant attention and improvement, yet once a shop is sure of a "dead-line" below which it cannot go on any job without loss, there is an incentive to search harder for jobs that will pay a profit, as has been proven many times.

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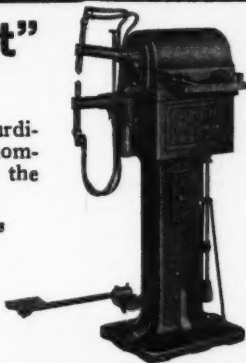
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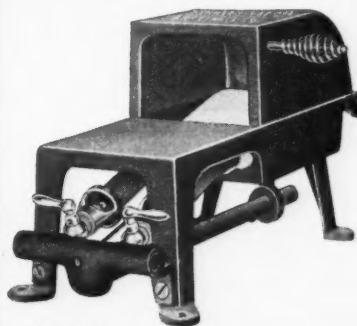
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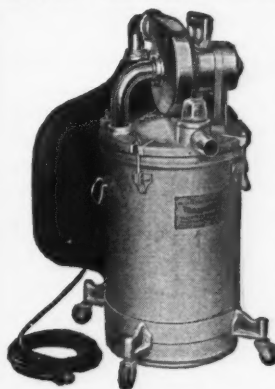
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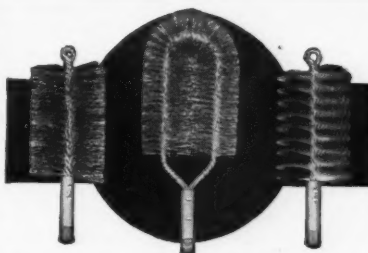
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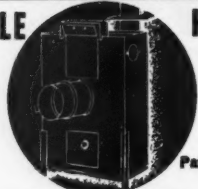
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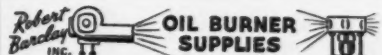
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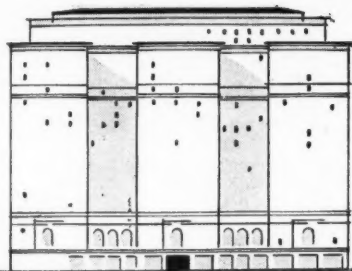
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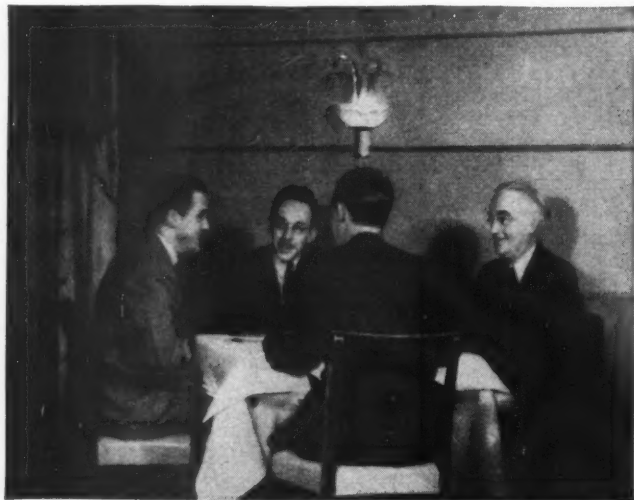
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Section of  
JANUARY, 1938  
**AMERICAN ARTISAN**

**1938  
DIRECTORY**

OF WARM AIR HEATING, RESIDENTIAL AIR  
CONDITIONING AND SHEET METAL PRODUCTS

Section 1.—Products Classified

Section 2.—Trade Names

Section 3.—Manufacturers' Addresses

**HOW TO USE THIS DIRECTORY**

If you want to know the names of one or more manufacturers making a certain product, look in Section 1, where that product will appear in its proper place in the listing. If you have the trade name of a product and want to know who manufactures it, look in Section 2, where trade names are alphabetically listed. For the complete name and address of any manufacturer, look in Section 3.

● The manufacturers whose names are dotted throughout the listing advertise their products in this issue. Turn to Index to Advertisers, page 192, for the page on which you will find the advertising of any of these manufacturers.

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## Section of American Artisan

### 1938 DIRECTORY OF WARM AIR HEATING, RESIDENTIAL AIR CONDITIONING AND SHEET METAL PRODUCTS

#### [ Section 1—PRODUCTS CLASSIFIED ]

#### AIR CONDITIONING UNITS, CENTRAL SYSTEM, BOILER TYPE

(Self-contained fan-filter-humidifier-heat transfer surface unit for connection to steam or hot water, refrigeration)

- Airtemp, Inc., Dayton, Ohio.
- American Blower Corp., Detroit, Mich.
- American Radiator Co., New York City
- Ames Co., W. R., San Francisco, Cal.
- Apex Rotarex Corp., Cleveland, O.
- Autovent Fan & Blower Co., Chicago, Ill.
- Baker Ice Machine Co., Inc., Omaha, Nebr.
- Betz Unit Air Cooler Co., Kansas City, Mo.
- Bishop & Babcock Sales Co., Cleveland, O.
- Bryan Steam Corp., Peru, Ind.
- Bryant Heater Co., Cleveland, O.
- Buffalo Forge Co., Buffalo, N. Y.
- Carbondale Division, Worthington Pump & Machinery Corp., Syracuse, N. Y.
- Carraway-Byrd Corp., Dallas, Tex.
- Carrier Corp., Syracuse, N. Y.
- Century Engineering Corp., Cedar Rapids, Ia.
- Clarage Fan Co., Kalamazoo, Mich.
- Delco-Frigidaire Conditioning Div., General Motors Sales Corp., Dayton, O.
- Easternoil, Inc., Portland, Me.
- Electrol, Inc., Clifton, N. J.
- Fargo Foundry Co., Fargo, N. D.
- Fitzgibbons Boiler Co., Inc., New York, N. Y.
- General Electric Co., Schenectady, N. Y.
- General Refrigeration Corporation, Beloit, Wis.
- Harvey-Whipple, Inc., Springfield, Mass.
- Heating Equipment Corp., Cambridge, Mass.
- Hell Co., Milwaukee, Wis.
- Howes Co., S. M., Boston, Mass.
- Hubbard Co., Minneapolis, Minn.
- Hugo Mfg. Co., West Duluth, Minn.
- Johnson Co., S. T., Oakland, Cal., and Philadelphia, Pa.
- Joliet Heating Corp., Joliet, Ill.
- Kelvinator Corp., Detroit, Mich.
- Kewanee Boiler Corp., Kewanee, Ill.
- Mayflower-Lewis Corp., St. Paul, Minn.
- May Oil Burner Corp., Baltimore, Md.
- McQuay, Inc., Minneapolis, Minn.
- Mellish & Murray Co., Chicago, Ill.
- Merrill Co., Inc., Boston, Mass.
- Modine Mfg. Co., Racine, Wis.
- Nash Refrigeration Co., Inc., Newark, N. J.
- National Air Conditioning, Inc., New York City.
- National Fan & Blower Corp., Subsidiary U. S. Air Conditioning Corp., Minneapolis, Minn.
- Nelson Corp., Herman, Moline, Ill.
- Niagara Blower Co., New York City.
- Norge Heating & Conditioning Division of Borg-Warner Corp., Detroit, Mich.
- Reif-Rexoil, Inc., Buffalo, N. Y.
- Robeson Engineering Co., East Orange, N. J.
- Scott-Newcomb, Inc., St. Louis, Mo.
- Stilphen Engineering & Mfg. Co., C. A., Denver, Colo.
- Syncro-Flame Burner Corp., Hartford, Conn.
- Syncromatic Air Conditioning Corp., Milwaukee, Wis.
- Thermal Units Mfg. Co., Meriden, Conn.
- Trane Co., La Crosse, Wis.
- Unified Air Conditioner Co., Duluth, Minn.
- United States Radiator Corp., Detroit, Mich.
- Utica Radiator Corp., Utica, N. Y.
- Waterfilm Boilers, Inc., Jersey City, N. J.
- Wayne Oil Burner Corp., Ft. Wayne, Ind.
- Williams Oil-O-Matic Heating Corp., Bloomington, Ill.
- Wood Industries, Inc., Gar, Detroit, Mich.
- York Ice Machinery Corp., York, Pa.
- Young Radiator Co., Racine, Wis.

#### AIR CONDITIONING UNITS, CENTRAL SYSTEM, FURNACE TYPE

(Self-contained fan-filter-washer or humidifier unit for warm air furnaces)

- Agricola Furnace Co., Inc., Gadsden, Ala.

- Airtemp, Inc., Dayton, O.
- American Air Conditioning Corp., Sebastopol, Cal.
- American Blower Corp., Detroit, Mich.
- American Foundry & Furnace Co., Bloomington, Ill.
- American Furnace Co., St. Louis, Mo.
- American Furnace & Foundry Co., Milan, Mich.
- American Machine Products Co., Marshalltown, Ia.
- Ames Co., W. R., San Francisco, Cal.
- Anchor Post Fence Co., Baltimore, Md.
- Arcweld Mfg. Co., Inc., Seattle, Wash.
- Arex Co., Chicago, Ill.
- Armstrong Furnace Co., Columbus, O.
- Atlas Heating & Ventilating Co., Ltd., San Francisco, Cal.
- Auburn Automobile Co., Air. Cond. Div., Chicago, Ill., and Connorsville, Ind.
- Auburn Burner Corp., Auburn, Ind.
- Autovent Fan & Blower Co., Chicago, Ill.
- Bard Manufacturing Co., Bryan, O.
- Beck Engineering Combustion Kompany, St. Louis, Mo.
- Bergstrom Mfg. Corp., Neenah, Wis.
- Bishop & Babcock Sales Co., Cleveland, O.
- Brundage Co., Kalamazoo, Mich.
- Bryan Plumbing & Heating Co., Bryan, O.
- Bryant Heater Co., Cleveland, O.
- Campbell Heating Co., Des Moines, Ia.
- Campbell Heating Co., E. K., Kansas City, Mo.
- Carrier Corp., Syracuse, N. Y.
- Chandler Co., Cedar Rapids, Ia.
- Chicago Steel Furnace Co., Chicago, Ill.
- Columbus Heating & Ventilating Co., Columbus, O.
- Crystal Refrigerator Co., Fremont, Nebr.
- Dall Steel Products Co., Lansing, Mich.
- Delco-Frigidaire Conditioning Div., General Motors Sales Corp., Dayton, O.
- Des Moines Steel Furnace Co., Des Moines, Iowa.
- Dowagiac Steel Furnace Co., Dowagiac, Mich.
- Economy Baler Co., Ann Arbor, Mich.
- Electrol, Inc., Clifton, N. J.
- Evans Corp., George, Moline, Ill.
- Fargo Foundry Co., Fargo, N. D.
- Farris Furnace Co., Springfield, Ill.
- Farquhar Furnace Co., Wilmington, O.
- Favorite Mfg. Co., Piqua, O.
- Floral City Co., Monroe, Mich.
- Forest City Foundries Co., Cleveland, O.
- Fox Furnace Co., Elyria, O.
- Furblo Co., Hermansville, Mich.
- Gehri Co., Tacoma, Wash.
- Gilbert & Barker Mfg. Co., Springfield, Mass.
- Green Foundry & Furnace Works, Des Moines, Ia.
- Hall-Neal Furnace Co., Indianapolis, Ind.
- Harvey-Whipple, Inc., Springfield, Mass.
- Hart & Crouse Co., Inc., Utica, N. Y.
- Hell Co., Milwaukee, Wis.
- Henry Furnace & Foundry Co., Cleveland, O.
- Hess Warming & Ventilating Co., Chicago, Ill.
- Holland Furnace Co., Holland, Mich.
- Home Furnace Co., Holland, Mich.
- Hotentot Co., Inc., Omaha, Nebr.
- Howes Co., S. M., Charlestown, Boston, Mass.
- Hubbard Co., Minneapolis, Minn.
- Ideal Furnace Co., Detroit, Mich.
- International Engineering, Inc., Dayton, O.
- International Heater Co., Utica, N. Y.
- Jaden Mfg. Co., Inc., F., Hastings, Nebr.
- Joliet Heating Corp., Joliet, Ill.
- Keith Furnace Co., Des Moines, Ia.
- Knox Stove Works, Knoxville, Tenn.
- LaCrosse Tractor Co., LaCrosse, Wis.
- Lau Blower Co., Dayton, O.
- Leeson Co., T. F., Detroit, Mich.
- Lennox Furnace Co., Marshalltown, Ia.
- MaGill Foundry & Furnace Works, P. H., Bloomington, Ill.
- Marshall Furnace Co., Marshall, Mich.
- May Oil Burner Corp., Baltimore, Md.
- Marvelaire Corp., West Los Angeles, Cal.
- McPherson Furnace & Supply Co., Portland, Ore.
- Mellish & Murray Co., Chicago, Ill.
- Meyer Furnace Co., Peoria, Ill.

- Montag Stove & Furnace Works, Portland, Ore.  
 ● Mueller Furnace Co., L. J., Milwaukee, Wis.  
 National Fan & Blower Corp., Subsidiary U. S. Air Conditioning Corp., Minneapolis, Minn.  
 Nelson Co., Detroit, Mich.  
 Nelson Corp., Herman, Moline, Ill.  
 Norge Heating & Conditioning Div. of Borg-Warner Corp., Detroit, Mich.  
 Oil Burner Builders, Inc., Bellevue, Ia.  
 ● Pacific Gas Radiator Co., Los Angeles, Cal.  
 ● Peerless Foundry Co., Indianapolis, Ind.  
 Pennsylvania Furnace & Iron Co., Warren, Pa.  
 Pioneer Air Conditioning Corp., Minneapolis, Minn.  
 ● Premier Furnace Co., Dowagiac, Mich.  
 Reif-Rexoll, Inc., Buffalo, N. Y.  
 Reynolds Corp., New York, N. Y.  
 Robeson Engineering Co., East Orange, N. J.  
 Robinson Furnace Co., Chicago, Ill.  
 Rock Island Stove Co., Rock Island, Ill.  
 ● Round Oak Co., Dowagiac, Mich.  
 Rudy Furnace Co., Dowagiac, Mich.  
 ● Schwitzer-Cummins Co., Indianapolis, Ind.  
 Scott-Newcomb, Inc., St. Louis, Mo.  
 Somers, Inc., H. J., Detroit, Mich.  
 Spray-Wheel Air Conditioners, Inc., Denver, Colo.  
 ● Surface Combustion Corp., Toledo, O.  
 Swift Corp., Carl E., Holland, Mich.  
 Synco-Flame Burner Corp., Hartford, Conn.  
 Syncromatic Air Conditioning Corp., Milwaukee, Wis.  
 Texo Sales & Mfg. Co., Cincinnati, O.  
 Thatcher Furnace Co., Newark, N. J.  
 Timken Silent Automatic Div., The Timken-Detroit Axle Co., Detroit, Mich.  
 ● Trane Co., La Crosse, Wis.  
 ● Twentieth Century Heating & Ventilating Co., Akron, O.  
 Unified Air Conditioner Co., Duluth, Minn.  
 ● U. S. Air Conditioning Corp., Minneapolis, Minn.  
 Utica Radiator Corp., 2201 Dwyer Ave., Utica, N. Y.  
 Viking Air Conditioning Corp., Cleveland, O.  
 ● Waterman-Waterbury Co., Minneapolis, Minn.  
 Wayne Oil Burner Corp., Fort Wayne, Ind.  
 Western Blower Co., Seattle, Wash.  
 ● Wise Furnace Co., Akron, O.  
 ● XXth Century Heating & Ventilating Co., Akron, O.  
 York Oil Burner Co., Inc., York, Pa.

### AIR CONDITIONING UNITS, ROOM TYPE, SUMMER

(Cabinet or suspended for cooling, circulating and cleaning)

- Advanced Refrigerating Systems Co., Philadelphia, Pa.  
 Air Devices Corp., Meriden, Conn.  
 Airecon Industries, Detroit, Mich.  
 Aire-Folle Fan & Blower Co., Detroit, Mich.  
 Airgard Manufacturing Co., Chicago, Ill.  
 Airtemp, Inc., Dayton, O.  
 American Air Conditioning Co., Minneapolis, Minn.  
 American Blower Corp., Detroit, Mich.  
 Apex Rotarex Corp., Cleveland, O.  
 ● Baker Ice Machine Co., Inc., Omaha, Nebr.  
 Barrett Engineers, Cleveland Heights, O.  
 ● Belanger Fan & Blower Co., 1230 18th St., Detroit, Mich.  
 Betz Unit Air Cooler Co., Kansas City, Mo.  
 ● Buffalo Forge Co., Buffalo, N. Y.  
 Builders Iron Foundry, Providence, R. I.  
 Campbell Heating Co., E. K., Kansas City, Mo.  
 Carbondale Division, Worthington Pump & Machinery Corp., Harrison, N. J.  
 Carraway-Byrd Corp., Dallas, Tex.  
 Carrier Corp., Syracuse, N. Y.  
 ● Clarage Fan Co., Kalamazoo, Mich.  
 Climax Machinery Co., Indianapolis, Ind.  
 Copeland Refrigeration Corp., Sidney, O.  
 Corozone Air Conditioning Corp., Cleveland, O.  
 Crystal Refrigerator Co., Fremont, Nebr.  
 Curtis Refrigerating Machine Co., St. Louis, Mo.  
 De La Vergne Engine Co., Philadelphia, Pa.  
 Delco-Frigidaire Conditioning Div., General Motors Sales Corp., Dayton, O.  
 Electrogas Furnace & Mfg. Co., San Francisco, Cal.  
 Electrol, Inc., Clifton, N. J.  
 Electrovent Fan & Mfg. Co., Chicago, Ill.  
 Fairbanks, Morse & Co., Chicago, Ill.  
 Fargo Foundry Co., Fargo, N. D.  
 Fedders Mfg. Co., Buffalo, N. Y.  
 General Air Conditioning Corp., Cincinnati, O.  
 ● General Electric Co., Schenectady, N. Y.  
 General Refrigeration Corp., Betloht, Wis.  
 Giant Mfg. Co., Council Bluffs, Ia.  
 Grinnell Co., Inc., Providence, R. I.  
 Hardy Mfg. Co., Dayton, O.  
 Hexcel Radiator Co., Racine, Wis.  
 Humidi-Cooler Corp., New Haven, Conn.  
 Ilg Electric Ventilating Co., Chicago, Ill.  
 Indian Trailer Corp., Koolroom Div., Chicago, Ill.  
 ● Jaden Mfg. Co., Inc., F., Hastings, Nebr.  
 Kauffman Air Conditioning Corp., St. Louis, Mo.  
 Kelvinator Corp., Detroit, Mich.  
 King Ventilating Co., Owatonna, Minn.  
 Mayflower-Lewis Corp., St. Paul, Minn.  
 McQuay, Inc., Minneapolis, Minn.  
 Marlo Coil Co., St. Louis, Mo.  
 Meier Electric & Machine Co., Indianapolis, Ind.  
 Nash Refrigeration Co., Inc., Newark, N. J.  
 National Fan & Blower Corp., Subsidiary U. S. Air Conditioning Corp., Minneapolis, Minn.  
 Nelson Corp., Herman, Moline, Ill.  
 Niagara Blower Co., New York City.  
 Nomis Corp., Lafayette, Ind.  
 Norge Heating & Conditioning Div. of Borg-Warner Corp., Detroit, Mich.  
 Norwin Co., Freeport, Ill.  
 ● Pacific Gas Radiator Co., Los Angeles, Cal.  
 "Pamco" Conditionaire Co., Chicago, Ill. (Cabinet)  
 Peerless of America, Inc., Chicago, Ill.  
 Pioneer Air Conditioning Corp., Minneapolis, Minn.  
 Polar Air, Inc., Dallas, Tex.  
 Rempe Coil Co., Chicago, Ill.  
 Russell Insulation Co., The F. C., Baltimore, Md.  
 Servel, Inc., Evansville, Ind.  
 Somers, Inc., H. J., Detroit, Mich.  
 Standard Air Conditioning, Inc., New York City.  
 Star Radiator Co., Los Angeles, Cal.  
 Stewart Ice Machine Co., Los Angeles, Cal.  
 Syncromatic Air Conditioning Corp., Milwaukee, Wis.  
 Texo Sales & Mfg. Co., Cincinnati, O.  
 Thermal Units Mfg. Co., Meriden, Conn.  
 ● Trane Co., La Crosse, Wis.  
 Unified Air Conditioner Co., Duluth, Minn.  
 Von Seebeck, G., New York City.  
 Westinghouse Electric & Mfg. Co., Mansfield, O.  
 Willard Metallic Crypt Co., Air Conditioning Div., Willard, O.  
 XL Refrigerating Co., Inc., Chicago, Ill.  
 York Ice Machinery Corp., York, Pa.  
 Young Radiator Co., Racine, Wis.

### AIR CONDITIONING UNITS, ROOM TYPE, WINTER

(Cabinet or suspended for heating, humidifying, circulating and cleaning)

- Airecon Industries, Detroit, Mich.  
 Airgard Manufacturing Co., Chicago, Ill.  
 Airtemp, Inc., Dayton, O.  
 American Air Conditioning Co., Minneapolis, Minn.  
 American Blower Corp., Detroit, Mich.  
 Apex Rotarex Corp., Cleveland, O.  
 Barrett Engineers, Cleveland Heights, O.  
 Betz Unit Air Cooler Co., Kansas City, Mo.  
 ● Buffalo Forge Co., Buffalo, N. Y.  
 Burnham Boiler Corp., Irvington, N. Y.  
 Campbell Heating Co., E. K., Kansas City, Mo.  
 Carraway-Byrd Corp., Dallas, Tex.  
 Carrier Corp., Syracuse, N. Y.  
 ● Clarage Fan Co., Kalamazoo, Mich.  
 Corozone Air Conditioning Corp., Cleveland, O.  
 Delco-Frigidaire Conditioning Div., General Motors Sales Corp., Dayton, O.  
 Des Moines Steel Furnace Co., Des Moines, Iowa.  
 Dunham Co., C. A., Chicago, Ill.  
 Electrogas Furnace & Mfg. Co., San Francisco, Cal.  
 Electrol, Inc., Clifton, N. J.  
 Fairbanks, Morse & Co., Chicago, Ill.  
 Fedders Mfg. Co., Buffalo, N. Y.  
 ● General Electric Co., Schenectady, N. Y.  
 Grinnell Co., Inc., Providence, R. I.  
 Hugo Mfg. Co., W. Duluth, Minn.  
 Ilg Electric Ventilating Co., Chicago, Ill.  
 Kauffman Air Conditioning Corp., St. Louis, Mo.  
 Mayflower-Lewis Corp., St. Paul, Minn.  
 McQuay, Inc., Minneapolis, Minn.  
 ● Mueller Furnace Co., L. J., Milwaukee, Wis.  
 National Fan & Blower Corp., Subsidiary U. S. Air Conditioning Corp., Minneapolis, Minn.  
 Nelson Corp., Herman, Moline, Ill.  
 Niagara Blower Co., New York City.  
 Norge Heating & Conditioning Div. of Borg-Warner Corp., Detroit, Mich.  
 ● Pacific Gas Radiator Co., Los Angeles, Cal.  
 Pioneer Air Conditioning Corp., Minneapolis, Minn.  
 Reif-Rexoll, Inc., Buffalo, N. Y.  
 Reznor Mfg. Co., Mercer, Pa.  
 Somers, Inc., H. J., Detroit, Mich.  
 Standard Air Conditioning, Inc., New York City.  
 Summerheat Co., South Bend, Ind. (Cabinet)  
 ● Surface Combustion Corp., Toledo, O.  
 Syncromatic Air Conditioning Corp., Milwaukee, Wis.  
 Texo Sales & Mfg. Co., Cincinnati, O.  
 Thermal Units Mfg. Co., Meriden, Conn.  
 ● Trane Co., La Crosse, Wis.  
 Unified Air Conditioner Co., Duluth, Minn.  
 Vigor-Aire Corp., Philadelphia, Pa.  
 Westinghouse Electric & Mfg. Co., Mansfield, O.  
 Young Radiator Co., Racine, Wis.

### AIR CONDITIONING UNITS, ROOM TYPE, YEAR AROUND

(Cabinet or suspended for heating, cooling, humidifying, dehumidifying, circulating and cleaning)

- Airecon Industries, Detroit, Mich.  
 Airgard Manufacturing Co., Chicago, Ill.



- Airtemp, Inc., Dayton, O.  
 American Blower Corp., Detroit, Mich.  
 Apex Rotarex Corp., Cleveland, O.  
 ● Baker Ice Machine Co., Inc., Omaha, Nebr.  
 Barrett Engineers, Cleveland Heights, O.  
 Betz Unit Air Cooler Co., Kansas City, Mo.  
 ● Buffalo Forge Co., Buffalo, N. Y.  
 Builders Iron Foundry, Providence, R. I.  
 Carraway-Byrd Corp., Dallas, Tex.  
 Carrier Corp., Syracuse, N. Y.  
 ● Clarage Fan Co., Kalamazoo, Mich.  
 Corozone Air Conditioning Corp., Cleveland, O.  
 De La Vergne Engine Co., Philadelphia, Pa.  
 Delco-Frigidaire Conditioning Div., General Motors Sales Corp., Dayton, O.  
 Electrogas Furnace & Mfg. Co., San Francisco, Cal.  
 Fairbanks, Morse & Co., Chicago, Ill.  
 Fedders Mfg. Co., Buffalo, N. Y.  
 ● General Electric Co., Schenectady, N. Y.  
 Grinnell Co., Inc., Providence, R. I.  
 Handelan Washed Air Co., Minneapolis, Minn.  
 Ilg Electric Ventilating Co., Chicago, Ill.  
 Kaiseraire Products Sales Co., Chicago, Ill.  
 Kauffman Air Conditioning Corp., St. Louis, Mo.  
 Kelvinator Corp., Detroit, Mich.  
 Mayflower-Lewis Corp., St. Paul, Minn.  
 McQuay, Inc., Minneapolis, Minn.  
 Meier Electric & Machine Co., Indianapolis, Ind.  
 Nash Refrigeration Co., Inc., Newark, N. J.  
 National Fan & Blower Corp., Subsidiary U. S. Air Conditioning Corp., Minneapolis, Minn.  
 Nelson Corp., Herman, Moine, Ill.  
 Niagara Blower Co., New York City.  
 Norge Heating & Conditioning Div. of Borg-Warner Corp., Detroit, Mich.  
 ● Pacific Gas Radiator Co., Los Angeles, Cal.  
 Peerless of America, Inc., Chicago, Ill.  
 Pioneer Air Conditioning Corp., Minneapolis, Minn.  
 Serval, Inc., Evansville, Ind.  
 Standard Air Conditioning, Inc., New York City.  
 Syncromatic Air Conditioning Corp., Milwaukee, Wis.  
 Texo Sales & Mfg. Co., Cincinnati, O.  
 Thermal Units Mfg. Co., Meriden, Conn.  
 ● Trane Co., La Crosse, Wis.  
 Unified Air Conditioner Co., Duluth, Minn.  
 Westinghouse Electric & Mfg. Co., Mansfield, O.  
 XL Refrigerating Co., Inc., Chicago, Ill.  
 York Ice Machinery Corp., York, Pa.  
 Young Radiator Co., Racine, Wis.

#### AIR CONDITIONING CONTROLS

*See Controls; Heating, Ventilating and Air Conditioning Systems, Fan and Limit, Combustion, Limit, Thermostats, Humidistats, etc.*

#### AIR CONDITIONING FURNACES

*(Matched Furnace-fan-filter-humidifier unit)  
 See Furnaces, Air Conditioning*

#### AIR CONDITIONING REGISTERS

*See Registers, Directional Flow*

#### AIR DIFFUSERS

*See Grilles and Registers*

#### AIR FILTERS

*See Filters, Air*

#### AIR METERS

*See Meters, Air Velocity, Direct Reading*

#### AIR WASHERS

*See Washers, Air*

#### ALLOY PLATES

*See Plates, Alloy*

#### ALLOY SHEETS

*See Sheets, Alloy*

#### ANALYZERS, FLUE GAS

Bacharach Industrial Instrument Co., Pittsburgh, Pa.  
 Ellison Draft Gage Co., Chicago, Ill.

- Harvey-Whipple, Inc., Springfield, Mass.  
 Hays Corp., Michigan City, Ind.  
 Leeds & Northrup Co., Philadelphia, Pa.  
 ● Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.  
 Preferred Utilities Corp., New York City.  
 Tagliabue Mfg. Co., C. J., Brooklyn, N. Y.

#### ANEMOMETERS

- Friez & Sons, Inc., Julien P., Baltimore, Md.  
 Hill Co., E. Vernon, Chicago, Ill.  
 ● Illinois Testing Laboratories, Inc., Chicago, Ill.  
 Precision Thermometer & Instrument Co., Philadelphia, Pa.  
 Taylor Instrument Companies, Rochester, N. Y.  
 Weston Electrical Instrument Corp., Newark, N. J.

#### ANGLES, BARS, BEAMS, CHANNELS AND TEES (STRUCTURAL SHAPES)

- Aluminum Company of America, Pittsburgh, Pa.  
 ● American Brass Co., Waterbury, Conn.  
 Bethlehem Steel Co., Bethlehem, Pa.  
 Byers Co., A. M., Pittsburgh, Pa.  
 Brasco Mfg. Co., Harvey, Ill.  
 Butler Street Foundry & Iron Co., Chicago, Ill.  
 ● Carnegie-Illinois Steel Co., Pittsburgh, Pa.  
 Chase Brass & Copper Co., Inc., Waterbury, Conn.  
 Columbia Steel Co., San Francisco, Cal.  
 Decatur Iron & Steel Co., Decatur, Ala.  
 Gulf States Steel Co., Birmingham, Ala.  
 Inland Steel Co., Chicago, Ill.  
 International Steel Co., Evansville, Ind.  
 Jones & Laughlin Steel Corp., Pittsburgh, Pa.  
 Laclede Steel Co., St. Louis, Mo.  
 ● Milcor Steel Co., Milwaukee, Wis.  
 ● Republic Steel Corp., Cleveland, O.  
 Revere Copper and Brass Incorporated, New York City.  
 ● Ryerson & Son, Inc., Jos. T., Chicago, Ill.  
 Steel and Tubes, Inc., Cleveland, O.  
 Stran-Steel Division, Great Lakes Steel Corp., Detroit, Mich.  
 Tennessee Coal, Iron & Railroad Co., Birmingham, Ala.  
 Truscon Steel Co., Youngstown, O.  
 ● United States Steel Corp., Pittsburgh, Pa.  
 Weirton Steel Co., Weirton, W. Va.  
 ● Youngstown Sheet & Tube Co., Youngstown, O.

#### ARC WELDERS

*See Welders, Arc*

#### ASBESTOS PAPER

*See Paper, Asbestos*

#### ATTIC FANS

*See Fans, Night Air Cooling*

#### AUTOMATIC COAL BURNERS

*See Stokers*

#### AUTOMATIC HUMIDIFIERS

*See Humidifiers, Furnace, Evaporation, Spray*

#### BAND SAWS

*See Saws, Band, Sheet Metal Cutting*

#### BARS

*See Angles, Bars, Beams, Channels and Tees (Structural Shapes)*

#### BASES AND PADS, VIBRATION, ISOLATING

- Allis-Chalmers Mfg. Co., Milwaukee, Wis.  
 Armstrong Cork Products Co., Lancaster, Pa. (Cork)  
 ● Buffalo Forge Co., Buffalo, N. Y.  
 Butterworth, B. T., Jr., New Canaan, Conn.  
 Cork Import Corp., New York City (Cork)  
 Corp Insulation Co., Inc., New York, N. Y.  
 Fabling Co., W. D., Los Angeles, Cal.  
 Felt Products Mfg. Co., Chicago, Ill.  
 Firestone Tire & Rubber Co., Akron, O.  
 ● General Electric Co., Schenectady, N. Y.  
 General Insulating Products Co., Brooklyn, N. Y.  
 Goodrich Co., B. F., Akron, O. (Rubber)  
 Korfund Co., Inc., Long Island City, N. Y.  
 Lehigh Fan & Blower Co., Allentown, Pa.  
 Lord Mfg. Co., Erie, Pa.  
 Manley Products Corp., York, Pa.  
 Mundet Cork Corp., New York City.  
 Ohio Electric Mfg. Co., Cleveland, O.



Rockwood Mfg. Co., Indianapolis, Ind. (Pivoted motor)  
 Smidth & Co., F. L., New York, N. Y.  
 Sturtevant Co., B. F., Boston, Mass.  
 Union Fibre Co., Inc., Winona, Minn.  
 United Cork Companies, Kearny, N. J.  
 United States Gypsum Co., Chicago, Ill.  
 Vibration Eliminator Co., Long Island City, N. Y. (Cork)

### BEAMS

*See Angles, Bars, Beams, Channels and Tees (Structural Shapes)*

### BEARINGS, FAN

Ahlberg Bearing Co., Chicago, Ill.  
 • Air Controls, Inc., Cleveland, O.  
 Chicago Die Casting Co., Chicago, Ill. (Pillow Block)  
 Consolidated Metals Corp., Detroit, Mich.  
 Fafnir Bearing Co., New Britain, Conn. (Ball)  
 Grand Rapids Die & Tool Co., Grand Rapids, Mich.  
 Jones Fdry. & Mach. Co., W. A., Chicago, Ill.  
 Link-Belt Co., Chicago, Ill. (Pillow Block)  
 Medart Co., St. Louis, Mo.  
 New Departure Mfg. Co., Bristol, Conn. (Ball)  
 Norma-Hoffman Bearings Corp., Stamford, Conn.  
 Ohio Pattern Works & Foundry Co., Cincinnati, O.  
 • Randall Graphite Products Corp., Chicago, Ill. (Pillow Block)  
 Roller Bearing Co. of America, Trenton, N. J.  
 • Schwitzer-Cummins Co., Indianapolis, Ind. (Pillow Block)  
 S K F Industries, Inc., Philadelphia, Pa. (Ball and Roller, Pillow block)  
 Viking Air Conditioning Corp., Cleveland, O.

### BELTS, FLAT

Alexander Bros., Philadelphia, Pa.  
 Continental Rubber Works, Erie, Pa. (Rubber and Fabric)  
 Dick Co., Inc., R. & J., Passaic, N. J. (Balata and Rubber)  
 Gilmer Co., L. H., Philadelphia, Pa.  
 Goodrich Co., B. F., Akron, O. (Rubber)  
 Goodyear Tire & Rubber Co., Akron, O.  
 Graton & Knight, Worcester, Mass.  
 Houghton & Co., E. F., Philadelphia, Pa.  
 Manhattan Rubber Mfg. Division of Raybestos-Manhattan, Inc., Passaic, N. J. (Rubber)  
 Rhodes & Sons, J. E., Philadelphia, Pa. (Leather)  
 Thermold Rubber, Div. of Thermold Co., Whitehead Rd., Trenton, N. J.

### BELTS, V-TYPE

Allis-Chalmers Mfg. Co., Milwaukee, Wis.  
 Browning Mfg. Co., Inc., Ohio Valley Pulley Works Division, Mayaville, Ky.  
 Continental Rubber Works, Erie, Pa.  
 Dayton Rubber Mfg. Co., Dayton, O.  
 Dick Co., Inc., R. & J., Passaic, N. J.  
 Dodge Mfg. Corp., Mishawaka, Ind.  
 Gates Rubber Co., Denver, Colo.  
 Gilmer Co., L. H., Philadelphia, Pa.  
 Goodrich Co., B. F., Akron, O.  
 Goodyear Tire & Rubber Co., Akron, O.  
 Manhattan Rubber Mfg. Division of Raybestos-Manhattan, Inc., Passaic, N. J.  
 Pyott Foundry & Machine Co., Chicago, Ill.  
 Rockwood Mfg. Co., Indianapolis, Ind.  
 Thermold Rubber, Div. of Thermold Co., Whitehead Rd., Trenton, N. J.  
 Wood's Sons Co., T. B., Chambersburg, Pa.  
 Worthington Pump & Machinery Corp., Harrisburg, N. J.

### BI-METALS, THERMOSTATIC

Callite Product Co., Union City, N. J.  
 Chace Co., W. M., Detroit, Mich.  
 Clifford Mfg. Co., Boston, Mass. (Bellows)  
 Laminated Metals Corp., Providence, R. I.  
 Wilson Co., H. A., Newark, N. J.

### BLADES, FAN

Advance Aluminum Castings Corp., Chicago, Ill.  
 • Air Conditioning Products Co., Detroit, Mich.  
 Aire-Folle Fan & Blower Co., Detroit, Mich.  
 Airmaster Corp., Chicago, Ill.  
 Autovent Fan & Blower Co., Chicago, Ill.  
 • Belanger Fan & Blower Co., Detroit, Mich.  
 Champion Blower & Forge Co., Lancaster, Pa.  
 • Clarage Fan Co., Kalamazoo, Mich.  
 Economy Electric Manufacturing Co., Cicero, Ill.  
 Grand Rapids Blow Pipe & Dust Arrester Co., Grand Rapids, Mich.  
 Janette Mfg. Co., Chicago, Ill.  
 • Lau Blower Co., Dayton, O.  
 Marathon Electric Mfg. Corp., Wausau, Wis.  
 Meier Electric & Machine Co., Indianapolis, Ind.  
 Myers Electric Co., Pittsburgh, Pa.

National Fan & Blower Corp., Subsidiary U. S. Air Conditioning Corp., Minneapolis, Minn.  
 • Peerless Electric Co., Warren, O.  
 Serval, Inc., Evansville, Ind.  
 Sturtevant Co., B. F., Hyde Park, Boston, Mass.  
 Steel and Tubes, Inc., Cleveland, O. (Stamping)  
 Swift Mfg. Co., Detroit, Mich.  
 Torrington Mfg. Co., Torrington, Conn.  
 • Utility Fan & Mfg. Company, Los Angeles, Cal.  
 • Victor Electric Products, Inc., Cincinnati, O.

### BLAST GATES

Airtherm Mfg. Co., St. Louis, Mo.  
 • Berger Bros. Co., Philadelphia, Pa.  
 Blower Application Co., Milwaukee, Wis.  
 • Buffalo Forge Co., Buffalo, N. Y.  
 Champion Blower & Forge Co., Lancaster, Pa.  
 • Clarage Fan Co., Kalamazoo, Mich.  
 Garden City Fan Co., Chicago, Ill.  
 Goethel Sheet Metal Works, Alfred, Milwaukee, Wis.  
 Goethel Co., Alfred C., Milwaukee, Wis.  
 Grand Rapids Blow Pipe and Dust Arrester Co., Grand Rapids, Mich.  
 Industrial Sheet Metal Works, Inc., Detroit, Mich.  
 Kirk & Blum Mfg. Co., Cincinnati, O.  
 Maysteel Products, Inc., Horicon St., Mayville, Wis.  
 Puhl & Hepper Mfg. Co., Inc., St. Louis, Mo.  
 R-S Products Corp., Philadelphia, Pa.  
 Sturtevant Co., B. F., Hyde Park, Boston, Mass.  
 Western Blower Co., Seattle, Wash.

### BLINDS, VENETIAN

Athey Co., Chicago, Ill.  
 Bostwick-Goodell Co., Norwalk, O.  
 Chicago Venetian Blind Co., Chicago, Ill.  
 Columbia Mills, Inc., Saginaw, Mich.  
 Higgin Mfg. Co., Newport, Ky.  
 Hough Co., Janesville, Wis.  
 Kane Mfg. Corporation, Kane, Pa.  
 Miller & Connell Co., Chicago, Ill.  
 Mitchell Moulding Co., Forest Park, Ill.  
 Patterson Shade Co., Indianapolis, Ind.  
 Schatz Venetian Blinds, Los Angeles, Cal.  
 Swedish Venetian Blind Co., New York, N. Y.  
 Warren Shade Co., Inc., Minneapolis, Minn.  
 Western Venetian Blind Co., New York, N. Y.  
 Yardley Screen & Weather Strip Corp., Columbus, O.

### BLOWER—FILTER UNITS

Agricola Furnace Co., Inc., Gadsden, Ala.  
 Air Conditioning Equipment Co., Minneapolis, Minn.  
 • Air Controls, Inc., Cleveland, O.  
 Aladdin Heating Corp., Oakland, Cal.  
 • American Foundry & Furnace Co., Bloomington, Ill.  
 American Furnace Co., St. Louis, Mo.  
 American Furnace & Foundry Co., Milan, Mich.  
 Ames Co., W. R., San Francisco, Cal.  
 Arcweld Mfg. Co., Inc., Seattle, Wash.  
 Atlas Heating & Ventilating Co., Ltd., San Francisco, Cal.  
 Baker Furnace & Cleaner Mfg. Co., Toledo, O.  
 Bard Mfg. Co., Bryan, O.  
 Bishop & Babcock Sales Co., Cleveland, O.  
 • Brundage Co., Kalamazoo, Mich.  
 • Buffalo Forge Co., Buffalo, N. Y.  
 Campbell Heating Co., Des Moines, Ia.  
 Champion Blower & Forge Co., Lancaster, Pa.  
 • Dail Steel Products Co., Lansing, Mich.  
 Des Moines Steel Furnace Co., Des Moines, Ia.  
 Dowagiac Steel Furnace Co., Dowagiac, Mich.  
 Economy Baler Co., Ann Arbor, Mich.  
 Electrogas Furnace & Mfg. Co., San Francisco, Cal.  
 Emerson Electric Mfg. Co., St. Louis, Mo.  
 Evans Corp., George, Moline, Ill.  
 Falstrom Co., Passaic, N. J.  
 Fargo Foundry Co., Fargo, N. D.  
 Farquhar Furnace Co., Wilmington, O.  
 • Fox Furnace Co., Elyria, O.  
 • Furblo Co., Hermansville, Mich.  
 Gehri Co., Tacoma, Wash.  
 Green Foundry & Furnace Works, Des Moines, Ia.  
 • Hall-Neal Furnace Co., Indianapolis, Ind.  
 • Henry Furnace & Foundry Co., Cleveland, O.  
 • Hess Warming & Ventilating Co., Chicago, Ill.  
 "Home Comfort" Furnace & Mfg. Co., St. Louis, Mo.  
 • Jaden Mfg. Co., Inc., F., Hastings, Nebr.  
 Kais Sunrise Works, Detroit, Mich.  
 Kelsey Heating Co., Syracuse, N. Y.  
 Kruse Co., Inc., Indianapolis, Ind.  
 LaCrosse Tractor Co., LaCrosse, Wis.  
 • Lau Blower Co., Dayton, O.  
 Lennox Furnace Co., Marshalltown, Ia.  
 Mayflower-Lewis Corp., St. Paul, Minn.  
 MaGirl Foundry & Furnace Works, P. H., Bloomington, Ill.  
 Marshall Furnace Co., Marshall, Mich.

- McPherson Furnace & Supply Co., Portland, Ore.
- Mellish & Murray Co., Chicago, Ill.
- Meyer Furnace Co., Peoria, Ill.
- Montag Stove & Furnace Works, Portland, Ore.
- Mueller Furnace Co., L. J., Milwaukee, Wis.
- Nelson Corp., Herman, Moline, Ill.
- Nomis Corp., Lafayette, Ind.
- Pacific Gas Radiator Co., Los Angeles, Cal.
- Payne Furnace & Supply Co., Beverly Hills, Cal.
- Peerless Electric Co., Warren, O.
- Peerless Foundry Co., Indianapolis, Ind.
- Pennsylvania Furnace & Iron Co., Warren, Pa.
- Perfect Burner, Lynn, Mass.
- Premier Furnace Co., Dowagiac, Mich.
- Roberts-Hamilton Co., Minneapolis, Minn.
- Robeson Engineering Co., East Orange, N. J.
- Round Oak Co., Dowagiac, Mich.
- Rudy Furnace Co., Dowagiac, Mich.
- Schwitzer-Cummins Co., Indianapolis, Ind.
- Sioux City Foundry and Boiler Co., Sioux City, Ia.
- Spray-Wheel Air Conditioners, Inc., Denver, Colo.
- Swift Corp., Carl E., Holland, Mich.
- Texo Sales & Mfg. Co., Cincinnati, O.
- Thatcher Furnace Co., Newark, N. J.
- U. S. Air Conditioning Corp., Minneapolis, Minn.
- Utility Fan & Mfg. Co., Los Angeles, Cal.
- Viking Air Conditioning Corp., Cleveland, O.
- Waterman-Waterbury Co., Minneapolis, Minn.
- Western Blower Co., Seattle, Wash.
- Wise Furnace Co., Akron, O.

### BLOWER—WASHER UNITS

- American Foundry & Furnace Co., Bloomington, Ill.
- American Furnace Co., St. Louis, Mo.
- American Machine Products Co., Marshalltown, Ia.
- Ames Co., W. R., San Francisco, Cal.
- Arcweld Mfg. Co., Inc., Seattle, Wash.
- Atlas Heating & Ventilating Co., Ltd., San Francisco, Cal.
- Bard Mfg. Co., Bryan, O.
- Bishop & Babcock Sales Co., Cleveland, O.
- Brundage Co., Kalamazoo, Mich.
- Buffalo Forge Co., Buffalo, N. Y.
- Campbell Heating Co., Des Moines, Ia.
- Champion Blower & Forge Co., Lancaster, Pa.
- Dall Steel Products Co., Lansing, Mich.
- Dowagiac Steel Furnace Co., Dowagiac, Mich.
- Economy Baler Co., Ann Arbor, Mich.
- Electrogas Furnace & Mfg. Co., San Francisco, Cal.
- Falstrom Co., Passaic, N. J.
- Fargo Foundry Co., Fargo, N. D.
- Furblo Co., Hermansville, Mich.
- Gehrl Co., Tacoma, Wash.
- King Ventilating Co., Owatonna, Minn.
- LaCrosse Tractor Co., LaCrosse, Wis.
- Lau Blower Co., Dayton, O.
- MaGrl Foundry & Furnace Works, P. H., Bloomington, Ill.
- Mellish & Murray Co., Chicago, Ill.
- Meyer Furnace Co., Peoria, Ill.
- Montag Stove & Furnace Works, Portland, Ore.
- Mueller Furnace Co., L. J., Milwaukee, Wis.
- National Fan & Blower Corp., Subsidiary U. S. Air Conditioning Corp., Minneapolis, Minn.
- Pacific Gas Radiator Co., Los Angeles, Cal.
- Robeson Engineering Co., East Orange, N. J.
- Round Oak Co., Dowagiac, Mich.
- Rudy Furnace Co., Dowagiac, Mich.
- Spray-Wheel Air Conditioners, Inc., Denver, Colo.
- Stilphen Engineering & Mfg. Co., C. A., Denver, Colo.
- Sturtevant Co., B. F., Hyde Park, Boston, Mass.
- Supreme Heater & Ventilating Corp., St. Louis, Mo.
- U. S. Air Conditioning Corp., Minneapolis, Minn.
- Waterman-Waterbury Co., Minneapolis, Minn.
- Wise Furnace Co., Akron, O.

### BLOWERS, FORCED DRAFT

- American Blower Corp., Detroit, Mich.
- American Foundry & Furnace Co., Bloomington, Ill.
- Arex Co., Chicago, Ill.
- Autovent Fan & Blower Co., Chicago, Ill.
- Signal Co., Medina, N. Y.
- Blower Application Co., Milwaukee, Wis.
- Brown Corp., Syracuse, N. Y.
- Buffalo Forge Co., Buffalo, N. Y.
- Burdett Mfg. Co., Chicago, Ill.
- Burnwell Corp., Allentown, Pa.
- Champion Blower & Forge Co., Lancaster, Pa.
- Clarage Fan Co., Kalamazoo, Mich.
- Coal Carburetor Co., New Brunswick, N. J.
- Economy Electric Manufacturing Co., Cicero, Ill.
- Electrovent Fan & Mfg. Co., Chicago, Ill.
- Falstrom Co., Passaic, N. J.
- Fuel Savers, Inc., Harrisburg, Pa.
- Garden City Fan Co., Chicago, Ill.
- General Blower Co., Philadelphia, Pa.

- Mohler Co., J. K., Ephrata, Pa.
- Muncie Gear Works, Inc., Muncie, Ind.
- New York Blower Co., Chicago, Ill.
- Pacific Gas Radiator Co., Los Angeles, Cal.
- Peerless Electric Co., Warren, O.
- Roberts-Hamilton Co., Minneapolis, Minn.
- Schwitzer-Cummins Co., Indianapolis, Ind.
- Sturtevant Co., B. F., Hyde Park, Boston, Mass.
- Universal Blower Co., Birmingham, Mich.
- Wing Mfg. Co., L. J., New York City.
- Wise Furnace Co., Akron, O.

### BLOWERS, FURNACE, CENTRIFUGAL

- Agricola Furnace Co., Inc., Gadsden, Ala.
- Air Conditioning Equipment Co., Minneapolis, Minn.
- Air Controls, Inc., Cleveland, O.
- American Blower Corp., Detroit, Mich.
- American Foundry & Furnace Co., Bloomington, Ill.
- American Furnace Co., St. Louis, Mo.
- American Machine Products Co., Marshalltown, Ia.
- Ames Co., W. R., San Francisco, Cal.
- Arcweld Mfg. Co., Inc., Seattle, Wash.
- Atlas Heating & Ventilating Co., Ltd., San Francisco, Cal.
- Autovent Fan & Blower Co., Chicago, Ill.
- Bard Mfg. Co., Bryan, Ohio.
- Bishop & Babcock Sales Co., Cleveland, O.
- Brundage Co., Kalamazoo, Mich.
- Buffalo Forge Co., Buffalo, N. Y.
- Campbell Heating Co., E. K., Kansas City, Mo.
- Campbell Heating Co., Des Moines, Ia.
- Champion Blower & Forge Co., Lancaster, Pa.
- Chandler Co., Cedar Rapids, Ia.
- Chicago Steel Furnace Co., Chicago, Ill.
- Clarage Fan Co., Kalamazoo, Mich.
- Dall Steel Products Co., Lansing, Mich.
- Des Moines Steel Furnace Co., Des Moines, Ia.
- Economy Baler Co., Ann Arbor, Mich.
- Economy Electric Mfg. Co., Cicero, Ill.
- Electrogas Furnace & Mfg. Co., San Francisco, Cal.
- Emerson Electric Mfg. Co., St. Louis, Mo.
- Falstrom Co., Passaic, N. J.
- Furblo Co., Hermansville, Mich.
- Garden City Fan Co., Chicago, Ill.
- Gehrl Co., Tacoma, Wash.
- General Blower Co., Philadelphia, Pa.
- Grand Rapids Die & Tool Co., Grand Rapids, Mich.
- Hall-Neal Furnace Co., Indianapolis, Ind.
- Hess Warming & Ventilating Co., Chicago, Ill.
- "Home Comfort" Furnace & Mfg. Co., St. Louis, Mo.
- Ideal Furnace Co., Detroit, Mich.
- Jaden Mfg. Co., Inc., F., Hastings, Nebr.
- LaCrosse Tractor Co., LaCrosse, Wis.
- Lau Blower Co., Dayton, O.
- Mahr Mfg. Co., Minneapolis, Minn.
- Marshall Furnace Co., Marshall, Mich.
- Meyer Furnace Co., Peoria, Ill.
- Montag Stove & Furnace Works, Portland, Ore.
- Mueller Furnace Co., L. J., Milwaukee, Wis.
- National Fan & Blower Corp., Subsidiary U. S. Air Conditioning Corp., Minneapolis, Minn.
- Nelson Corp., Herman, Moline, Ill.
- New York Blower Co., Chicago, Ill.
- Niagara Blower Co., New York City.
- Pacific Gas Radiator Co., Los Angeles, Cal.
- Peerless Electric Co., Warren, O.
- Premier Furnace Co., Dowagiac, Mich.
- Robeson Engineering Co., East Orange, N. J.
- Roots-Connersville Blower Corp., Connersville, Ind.
- Security Stove & Mfg. Co., Kansas City, Mo.
- Schwitzer-Cummins Co., Indianapolis, Ind.
- Spear Stove & Heating Co., Jas., Philadelphia, Pa.
- Spray-Wheel Air Conditioners, Inc., Denver, Colo.
- U. S. Air Conditioning Corp., Minneapolis, Minn.
- Utility Fan & Mfg. Co., Los Angeles, Cal.
- Viking Air Conditioning Corp., Cleveland, O.
- Waterman-Waterbury Co., Minneapolis, Minn.
- Western Blower Co., Seattle, Wash.
- Wing Mfg. Co., L. J., New York City
- Wolverine Blower Works, Grand Rapids, Mich.

### BLOWERS, VENTILATING SYSTEM

(Capacity 4,000 c.f.m. up)

- Advance Fan & Blower Co., Detroit, Mich.
- Air Controls, Inc., Cleveland, O.
- American Blower Corp., Detroit, Mich.
- American Coolair Corp., Jacksonville, Fla.
- American Foundry & Furnace Co., Bloomington, Ill.
- Ames Co., W. R., San Francisco, Cal.
- Arcweld Mfg. Co., Inc., Seattle, Wash.
- Arex Co., Chicago, Ill.
- Atlas Heating & Ventilating Co., Ltd., San Francisco, Cal.
- Autovent Fan & Blower Co., Chicago, Ill.
- Barrett Engineers, Cleveland Heights, O.
- Bayley Blower Co., Milwaukee, Wis.
- Berns Specialty Co., Chicago, Ill.
- Bishop & Babcock Sales Co., Cleveland, O.



- Brundage Co., Kalamazoo, Mich.
- Buffalo Forge Co., Buffalo, N. Y.
- Burt Mfg. Co., Akron, O.
- Campbell Heating Co., E. K., Kansas City, Mo.
- Champion Blower & Forge Co., Lancaster, Pa.
- Clarage Fan Co., Kalamazoo, Mich.
- Coppus Engineering Corp., Worcester, Mass.
- De Bothezat Ventilating Equipment Division, American Machine & Metals, Inc., New York City
- Des Moines Steel Furnace Co., Des Moines, Iowa.
- Durlon Co., Inc., Dayton, O. (Acid Resisting)
- Economy Electric Manufacturing Co., Cicero, Ill.
- Emerson Electric Mfg. Co., St. Louis, Mo.
- Evry-Use Products, Inc., New York City
- Falstrom Co., Passaic, N. J.
- Fargo Foundry Co., Fargo, N. D.
- Furblo Co., Hermansville, Mich.
- Garden City Fan Co., Chicago, Ill.
- General Blower Co., Philadelphia, Pa.
- Grand Rapids Blow Pipe and Dust Arrester Co., Grand Rapids, Mich.
- Grand Rapids Die & Tool Co., Grand Rapids, Mich.
- Hartzell Propeller Fan Co., Piqua, O.
- Ilg Electric Ventilating Co., Chicago, Ill.
- Industrial Sheet Metal Works, Inc., Detroit, Mich.
- Jaden Mfg. Co., Inc., F., Hastings, Nebr.
- Johnson Fan & Blower Corp., Chicago, Ill.
- LaCrosse Tractor Co., LaCrosse, Wis.
- Lau Blower Co., Dayton, O.
- MaGill Foundry & Furnace Works, P. H., Bloomington, Ill.
- Mechanical Air, Little Rock, Ark.
- Mountain States Equipment Co., Denver, Colo.
- National Air Conditioning Engineering Corp., Kansas City, Mo.
- National Fan & Blower Corp., Subsidiary U. S. Air Conditioning Corp., Minneapolis, Minn.
- Northern Blower Co., Cleveland, Ohio.
- New York Blower Co., Chicago, Ill.
- Niagara Blower Co., New York City
- Pacific Gas Radiator Co., Los Angeles, Cal.
- Puhl & Hepper Mfg. Co., Inc., St. Louis, Mo.
- Reynolds Manufacturing Co., Grand Rapids, Mich.
- Roberts-Hamilton Co., Minneapolis, Minn.
- Round Oak Co., Dowagiac, Mich.
- Schwitzer-Cummins Co., Indianapolis, Ind.
- Smith Heater Co., Peter, Detroit, Mich.
- Spray-Wheel Air Conditioners, Inc., Denver, Colo.
- Star Electric Motor Co., Bloomfield, N. J.
- Sturtevant Co., B. F., Hyde Park, Boston, Mass.
- Supreme Heater & Ventilating Corp., St. Louis, Mo.
- U. S. Air Conditioning Corp., Minneapolis, Minn.
- Utility Fan & Mfg. Co., Los Angeles, Cal.
- Victor Electric Products, Inc., Cincinnati, O.
- Western Blower Co., Seattle, Wash.
- Wing Mfg. Co., L. J., New York City
- Wolverine Blower Works, Grand Rapids, Mich.

### BLOWER WHEELS

*See Wheels, Blower*

### BLOW PIPE EQUIPMENT

*See Blast Gates; Collectors, Blow Pipe; Fittings, Blow Pipe*

### BLOW TORCHES

*See Torches, Brazing, Cutting, Welding, Soldering*

### BOOSTER FANS

*See Fans, Booster*

### BOOTS, FURNACE PIPE

*See Fittings and Accessories, Furnace Pipe*

### BRAKES, METAL WORKERS', HAND

- Allsteel Press Co., Inc., Chicago, Ill.
- Bertsch & Co., Cambridge City, Ind.
- Dreis & Krump Mfg. Co., Chicago, Ill.
- Eiker Mfg. Co., The, Ogallala, Nebr.
- Excelsior Tool and Machine Co., East St. Louis, Ill.
- Glascock Bros. Mfg. Co., Muncie, Ind.
- New Albany Machine Mfg. Co., New Albany, Ind.
- Niagara Machine & Tool Works, Buffalo, N. Y.
- Peck, Stow & Wilcox Co., Southington, Conn.
- Steelweld Machinery Co., Cleveland, O.
- Whitney Metal Tool Co., Rockford, Ill.

### BRAKES, METAL WORKERS', POWER

- Allsteel Press Co., Inc., Chicago, Ill.
- Bertsch & Co., Cambridge City, Ind.
- Cincinnati Shaper Co., Cincinnati, O.
- Dreis & Krump Mfg. Co., Chicago, Ill.
- Heartley Machine & Tool Co., Toledo, O.
- Niagara Machine & Tool Works, Buffalo, N. Y.

- Ohl & Co., Geo. A., Newark, N. J.
- Peck, Stow & Wilcox Co., Southington, Conn.
- Rafter Machine Co., Belleville, N. J.
- Whitney Metal Tool Co., Rockford, Ill.

### BRAZING TORCHES

*See Torches, Brazing, Cutting, Welding*

### BRUSHES, ACID

- Cleveland Brush Factory, Inc., Cleveland, O.
- Lukens Metal Co., Thos. F., Philadelphia, Pa.
- Meyer & Bro. Co., F., Peoria, Ill.
- Milwaukee Brush Mfg. Co., Milwaukee, Wis.
- Osborn Mfg. Co., Cleveland, O.
- Potomac Mfg. Co., Philadelphia, Pa.
- Schaefer Brush Mfg. Co., Milwaukee, Wis.

### BRUSHES, FURNACE

- Cleveland Brush Factory, Inc., Cleveland, O.
- Mill-Rose Co., Cleveland, O.
- Milwaukee Brush Mfg. Co., Milwaukee, Wis.
- Osborn Mfg. Co., Cleveland, O.
- Pille Packing & Flue Brush Mfg. Co., St. Louis, Mo.
- Schaefer Brush Mfg. Co., Milwaukee, Wis.
- Swift Corp., Carl E., Holland, Mich.
- Worcester Brush & Scraper Co., Worcester, Mass.

### BUFFERS, GRINDERS, POLISHERS AND SANDERS, ELECTRIC

- Black & Decker Mfg. Co., Towson, Md.
- Independent Pneumatic Tool Co., Chicago, Ill.
- Mall Tool Co., Chicago, Ill.
- Misener Mfg. Co., Inc., Syracuse, N. Y.
- Stansaw, Inc., Chicago, Ill.
- Stanley Electric Tool Div., The Stanley Works, New Britain, Conn.
- Wodack Electric Tool Corp., Chicago, Ill.

### BUILDING INSULATION

*See Insulation, Building*

### BURNERS, GAS, CONVERSION

- American Gas Products Corp., New York City.
- Barber Gas Burner Co., Cleveland, O.
- Beck Engineering Combustion Kompany, St. Louis, Mo.
- Bryan Steam Corp., Peru, Ind.
- Bryant Corp., C. L., Cleveland, O.
- Bryant Heater Co., Cleveland, O.
- Burdett Mfg. Co., Chicago, Ill.
- Columbia Burner Co., Toledo, O.
- Continental Stove Corp., Ironton, O.
- Franklin Gas Appliance Co., Cincinnati, O.
- Johnson Gas Appliance Co., Cedar Rapids, Iowa.
- Leahy Mfg. Co., Los Angeles, Cal.
- National Machine Works, Chicago, Ill.
- National Mfg. & Engineering Co., Detroit, Mich.
- R-S Products Corp., Philadelphia, Pa.
- Republic Flow Meters Co., Chicago, Ill.
- Roberts-Gordon Appliance Corp., Buffalo, N. Y.
- Rotary Mfg. Co., Los Angeles, Cal.
- Scott-Newcomb, Inc., St. Louis, Mo.
- Security Stove & Mfg. Co., Kansas City, Mo.
- Sioux City Foundry and Boiler Co., Sioux City, Iowa.
- Sonner Burner Co., Winfield, Kan.
- Spencer Heater Division, Williamsport, Pa.
- Standard Heating & Radiator Co., Pittsburgh, Pa.
- Surface Combustion Corp., Toledo, O.

### BURNERS, OIL

- Ace Engineering Co., Chicago, Ill. (Rotary)
- Acme Oil Burner Company, Inc., Cedar Rapids, Ia. (Gun)
- Airtemp, Inc., Dayton, O.
- Aldrich Co., Peoria, Ill.
- American Oil Burners & Heating Utilities, Brooklyn, N. Y.
- Anchor Post Fence Co., Baltimore, Md. (Gun and rotary)
- Arcweld Mfg. Co., Inc., Seattle, Wash.
- Auburn Burner Corp., Auburn, Ind. (Gun and rotary)
- Autocrat Oil Burner Corp., Cedar Rapids, Ia.
- Auto-Heat Corp., New York City.
- Automatic Burner Corp., Chicago, Ill. (Gun and rotary)
- Badger Mfg. Co., Madison, Wis. (Gun)
- Ballard, Inc., Arthur H., Boston, Mass.
- Beatrice Steel Tank Mfg. Co., Beatrice, Nebr.
- Bennett Corp., W. M., Omaha, Nebr. (Gun)
- Berryman Oil Burner Co., Chicago, Ill.
- Bethlehem Foundry & Machine Co., Bethlehem, Pa. (Gun)
- Braden Engineering, Inc., Providence, R. I. (Pressure gun)
- Brigham Oil Burner Co., St. Louis, Mo. (Gun and gravity)
- Brown Oil Burning Equipment Co., Cambridge, Mass. (Gun and rotary)
- Bryan Steam Corp., Peru, Ind. (Rotary and gun)



- Caloroll Burner Corp., Hartford, Conn. (Atmospheric, gun, horizontal, rotary, vacuum pressure, wall flame)
- Cary Mfg. Co., Waupaca, Wis. (Gravity)
- Century Engineering Corp., Cedar Rapids, Ia. (Gun)
- Chalmers Oil Burner Co., Minneapolis, Minn. (Gun and rotary)
- Char-Gale Mfg. Co., Minneapolis, Minn.
- Chicago Steel Furnace Co., Chicago, Ill.
- Cleveland Steel Products Corp., Cleveland, O. (Gun and rotary)
- Columbus Metal Products, Inc., Columbus, Ohio.
- Crystal Refrigerator Co., Fremont, Nebr.
- Delco-Frigidaire Conditioning Div., General Motors Sales Corp., Dayton, O.
- D'Elia Oil Burner Co., Inc., Bridgeport, Conn. (Gun)
- Easternoll, Inc., Portland, Me. (Gun)
- Electrol, Inc., Clifton, N. J.
- Elec-Tro-Matic Oil Burner Co., Cedarhurst, L. I., N. Y. (Gun)
- Enterprise Oil Burner Co., San Francisco, Cal. (Horizontal rotary)
- Excellor Oil Heating Corp., Omaha, Nebr.
- Fargo Foundry Co., Fargo, N. D.
- Fairfield Oil Heating Co., Inc., Greenwich, Conn.
- Gasoroll Furnace Co., Chicago, Ill.
- General Electric Co., Schenectady, N. Y.
- General Oil Heating Corp., West New York, N. J. (Gun)
- Gilbert & Barker Mfg. Co., Springfield, Mass. (Gun)
- Gold Star Oil Burner Mfg. Co., Inc., Yonkers, N. Y. (Gun)
- Green Foundry & Furnace Works, Des Moines, Ia. (Gun)
- Grinnell Washing Machine Corp., Grinnell, Ia.
- Hall-Neal Furnace Co., Indianapolis, Ind.
- Hardinge Oil Burner Co., Chicago, Ill.
- Hart Oil Burner Corp., Peoria, Ill. (Gun)
- Harvey-Whipple, Inc., Springfield, Mass. (Gun)
- Hell Co., Milwaukee, Wis. (Gun)
- Hess Warming and Ventilating Co., Chicago, Ill.
- Hipoint Corp., Bellefontaine, O.
- Holtum Mfg. Co., Freeport, Ill. (Gun)
- Home Oil Burner Corp., Hempstead, N. Y. (Gun)
- Hotentot Co., Inc., Omaha, Nebr. (Gun and gravity)
- Hubbard Co., Minneapolis, Minn. (Gun)
- Hupp Oil Burner Co., Inc., Brooklyn, N. Y. (Gun)
- Ingle Mfg. Co., San Diego, Cal. (Gravity)
- Iowa Foundry Co., Sioux City, Ia.
- Jacobsen Mfg. Co., Racine, Wis. (Gun)
- Johnson Co., S. T., Oakland, Cal. (Rotary)
- Johnson Mfg. Co., Waterloo, Ia. (Gun)
- Johnston Mfg. Co., Minneapolis, Minn. (Gun)
- Kais Sunrise Works, Detroit, Mich. (Gravity and rotary)
- Kaybar Burner Corp., Chicago, Ill.
- Kelvinator Corp., Detroit, Mich. (Gun)
- Kisco Co., Inc., St. Louis, Mo.
- Kleen Heet, Inc., Chicago, Ill. (Gun)
- Korth Oil Burner Corp., Roselle Park, N. J. (Rotary and Gun)
- Laco Oil Burner Co., Griswold, Ia.
- Landwehr Heating Corp., Philadelphia, Pa.
- Leahy Mfg. Co., Los Angeles, Cal.
- Leeson Co., T. F., Detroit, Mich. (Gun)
- Little Burner Co., Inc., H. C., San Rafael, Cal. (Gravity)
- Littleford Bros., Cincinnati, O.
- Lynn Products Co., Lynn, Mass. (Gun)
- Mahan Oil Burner & Furnace Co., Elmhurst, Ill. (Gravity)
- Malleable Iron Fittings Co., Branford, Conn. (Gun)
- Marshall Furnace Co., Marshall, Mich.
- May Oil Burner Corp., Baltimore, Md. (Gun)
- Mayflower Oil Burner Corp., West New York, N. J. (Gun)
- Meyer Furnace Co., Peoria, Ill.
- Micro-Westco, Inc., Bettendorf, Iowa.
- Morrissey & Co., Chicago, Ill. (Gun)
- Motor Wheel Corp., Lansing, Mich. (Gun)
- National Airoil Burner Co., Philadelphia, Pa. (Gun)
- National Mfg. & Engineering Co., Detroit, Mich.
- Nelson Corp., Herman, Moline, Ill.
- Nomis Corporation, The, Lafayette, Ind.
- Norge Heating & Conditioning Div., Borg-Warner Corp., Detroit, Mich.
- Nu-Way Corp., Rock Island, Ill.
- Oil Burner Builders, Inc., Bellevue, Ia. (Gun)
- Pan American Engineering Corp., Ltd., Berkeley, Cal. (Gun, rotary and turbine)
- Peerless Oil Burner Co., Inc., Kansas City, Mo. (Gravity)
- Peoples Oil Burner Co., Chicago, Ill. (Gravity)
- Perfect Burner Co., Lynn, Mass. (Gun)
- Perfection Stove Co., Cleveland, O.
- Petroleum Heat & Power Co., Stamford, Conn. (Rotary, gravity and gun)
- Phillips Heating, Ventilating & Mfg. Co., Los Angeles, Cal. (Gravity)
- Pioneer Oil Burner Co., Cedar Rapids, Ia.
- Preferred Utilities Manufacturing Corp., New York City
- Pressure Oil Burners, Inc., York, Pa. (Gun)
- R-S Products Corp., Philadelphia, Pa. (Gun)
- Ray Oil Burner Co., San Francisco, Cal. (Gun and rotary)
- Reif-Rexoil, Inc., Buffalo, N. Y.
- Rotary Mfg. Co., Los Angeles, Cal. (Rotary)
- Round Oak Co., Dowagiac, Mich.
- Scott-Newcomb, Inc., St. Louis, Mo. (Gun)
- Sentry Mfg. Co., Omaha, Nebr. (Gun)
- Shedlov Oil Burners, Inc., Minneapolis, Minn. (Gravity and gun)
- Silent Glow Oil Burner Corp., Hartford, Conn.

- Silent Sioux City Burner Corp., Orange City, Ia. (Gravity)
- Simplex Oil Heating Corp., New York City (Gun, rotary and turbine)
- Skinner Co., E. W., Fitchburg, Mass. (Gravity)
- Summerheat Co., South Bend, Ind. (Low pressure)
- Sundstrand Engineering Co., Rockford, Ill. (Gun)
- Sun-Ray Oil Burner Corp., Rockaway Park, N. Y. (Gun)
- Synco-Flame Burner Corp., Hartford, Conn. (Gun)
- Timken Silent Automatic Co., Detroit, Mich. (Gun and rotary)
- Todd Combustion Equipment, Inc., Brooklyn, N. Y.
- Uni-Fire Co., Detroit, Mich. (Rotary)
- United States Burner Corp., Hartford, Conn. (Gun and rotary)
- Valley Mfg. Co., Athol, Mass. (Gun and rotary)
- Victor Oil Burner Mfg. Co., Hartford, Conn. (Gravity)
- Viking Mfg. Co., Akron, Ohio.
- Volcano Burner Corp., New York City. (Gun)
- Wayne Oil Burner Corp., Fort Wayne, Ind. (Gun)
- Weiskittel Co., Inc., Harry C., Baltimore, Md.
- Westchester Home Equipment Co., Inc., Bronx, N. Y. (Gun)
- Westwick & Son, Inc., John, Galena, Ill. (Gun)
- Williams Oil-O-Matic Heating Corp., Bloomington, Ill. (Gun)
- Wood Industries, Inc., Gar, Detroit, Mich. (Gun)
- Woolery Machine Co., Minneapolis, Minn. (Gun)
- York Oil Burner Co., Inc., York, Pa. (Gun)

## CABINET HEATERS

See Heaters, Cabinet

## CABINETS AND CASINGS

- Berger Mfg. Co., Div. of Republic Steel Corp., Canton, O.
- Char-Gale Mfg. Co., Minneapolis, Minn.
- Columbus Heating & Ventilating Co., Columbus, Ohio.
- Geuder, Paeschke & Frey Co., Milwaukee, Wis.
- General Metal Products Co., St. Louis, Mo.
- Gillian Mfg. Co., Ferndale, Mich.
- Lau Blower Co., Dayton, Ohio.
- Martin-Parry Corp., York, Pa.
- Maysteel Products, Inc., Mayville, Wis.
- Mullins Mfg. Corp., Salem, O.
- Youngtown Pressed Steel Co., Warren, O.

## CAPS AND TOPS, CHIMNEY

- Accurate Mfg. Works, Chicago, Ill.
- Acme Tin Plate & Roofing Supply Co., Philadelphia, Pa.
- Adams Co., Dubuque, Ia.
- Allen Corp., Detroit, Mich.
- Ames Co., W. R., San Francisco, Cal.
- Berger Mfg. Co., Div. of Republic Steel Corp., Canton, O.
- Chicago Metal Mfg. Co., Chicago, Ill.
- Decatur Iron & Steel Co., Decatur, Ala.
- Edwards Mfg. Co., Inc., Cincinnati, O.
- Excelsior Steel Furnace Co., Chicago, Ill.
- Hirschman Co., Inc., W. F., Buffalo, N. Y.
- Industrial Sheet Metal Works, Inc., Detroit, Mich.
- Iwan Brothers, South Bend, Ind.
- Kleenaire Corp., Stevens Point, Wis.
- Lamb & Ritchie Co., Cambridge, Mass.
- Martin Metal Mfg. Co., Wichita, Kan.
- Meyer & Bro. Co., F., Peoria, Ill.
- Milcor Steel Co., Milwaukee, Wis.
- Neemes Foundry, Inc., Troy, N. Y.
- Providence Cornice Co., Providence, R. I.
- Ryniker Sheet Metal Works, Inc., Billings, Mont.
- Schoedinger Co., F. O., Columbus, O.
- Southbridge Roofing Co., Inc., Southbridge, Mass.
- Sterling Foundry Company, Sterling, Ill. (Cast iron)
- Tierney Rotor Ventilator Co., Minneapolis, Minn.
- Vall Mfg. Co., Fort Wayne, Ind.
- Vermont Structural Slate Co., Fair Haven, Vt.
- Watson Co., Inc., Jaa. H., Bradley, Ill.

## CASINGS

See Cabinets and Casings

## CAULKING COMPOUNDS

See Compounds, Caulking

## CEILINGS, METAL

- Berger Mfg. Div. of Truscon Steel Corp., Canton, O.
- Berger Mfg. Co., Div. of Republic Steel Corp., Canton, Ohio.
- Brooklyn Metal Ceiling Co., Brooklyn, N. Y.
- Canton Steel Ceiling Mfg. Co., Canton, O.
- Edwards Mfg. Co., Inc., Cincinnati, O.
- Friedley-Voshardt Co., Chicago, Ill.
- International Steel Co., Evansville, Ind.
- Klauer Mfg. Co., Dubuque, Ia.
- Maysteel Products, Inc., Mayville, Wis.
- Mesker & Co., Geo. L., Evansville, Ind.
- Milcor Steel Co., Milwaukee, Wis.
- Norman Sheet Metal Mfg. Co., W. F., Nevada, Mo.
- Reeves Steel & Mfg. Co., Dover, O.
- St. Paul Corrugating Co., St. Paul, Minn.
- Schoedinger Co., F. O., Columbus, O.

Tennessee Coal, Iron & Railroad Co., Birmingham, Ala. (Galvanized steel beaded)  
 Watson Co., Inc., Jas. H. Bradley, Ill.  
 Wheeling Corrugating Co., Wheeling, W. Va.  
 Woolwine Metal Products Co., Los Angeles, Cal.

### CEMENT, ASBESTOS

Certain-teed Products Corp., New York City.  
 Chicago Fire Brick Co., Chicago, Ill.  
 Clinton Metallic Paint Co., Clinton, N. Y.  
 Connors Paint Mfg. Co., Wm., Troy, N. Y.  
 Eagle-Picher Lead Co., Cincinnati, O.  
 Ehret Magnesia Mfg. Co., Valley Forge, Pa.  
 Hercules Chemical Co., Inc., New York City  
 Johns-Manville, New York City.  
 Keasbey & Mattison Co., Ambler, Pa.  
 • Laclede-Christy Clay Products Co., St. Louis, Mo.  
 Norristown Magnesia & Asbestos Co., Norristown, Pa.  
 Ohmlac Paint & Refining Co., Chicago, Ill.  
 Pecora Paint Co., Philadelphia, Pa.  
 Preferred Utilities Mfg. Corp., New York City  
 Ruberoid Co., New York City.  
 Rutland Fire Clay Co., Rutland, Vt.  
 • Sall Mountain Co., Chicago, Ill.  
 Schundler & Co., Inc., F. E., Long Island City, N. Y.  
 Smith & Kanzler, Inc., Elizabeth, N. J.  
 Standard Asbestos Mfg. Co., Chicago, Ill.  
 Tamms Silica Co., Chicago, Ill.  
 Thompson & Co., Pittsburgh, Pa.  
 Wilhelm Co., A., Reading, Pa.  
 Wilson, Inc., Grant, Chicago, Ill.

### CEMENT, FURNACE

Acme Refining Co., Cleveland, O.  
 • Armstrong Co., Detroit, Mich.  
 Barber Co., Inc., Philadelphia, Pa.  
 Buckeye Products Co., Cincinnati, O.  
 Carey Co., Philip, Lockland, Cincinnati, O.  
 Clinton Metallic Paint Co., Clinton, N. Y.  
 Connors Paint Mfg. Co., Wm., Troy, N. Y.  
 Continental Products Co., Euclid, O.  
 Eagle-Picher Lead Co., Cincinnati, O.  
 Ehret Magnesia Mfg. Co., Valley Forge, Pa.  
 Fireline Stove & Furnace Lining Co., Chicago, Ill.  
 Hercules Chemical Co., Inc., New York City.  
 Hetzel Roofing Products Co., Newark, N. J.  
 Iowa Paint Mfg. Co., Des Moines, Ia.  
 Johns-Manville, New York City.  
 Keasbey & Mattison Co., Ambler, Pa.  
 Krehbiel, J. H., Chicago, Ill.  
 • Laclede-Christy Clay Products Co., St. Louis, Mo.  
 Lastik Products Co., Inc., Pittsburgh, Pa.  
 Pecora Paint Co., Philadelphia, Pa.  
 Plastic Products Co., Detroit, Mich.  
 Preferred Utilities Mfg. Corp., New York City.  
 Preasite Engineering Co., St. Louis, Mo.  
 • Pyrolite Products Co., Cleveland, O.  
 Ramtite Co., Chicago, Ill.  
 Rex Clay Products Co., Detroit, Mich.  
 Ruberoid Co., New York City.  
 Rutland Fire Clay Co., Rutland, Vt.  
 Sauereisen Cements Co., Sharpsburg, Pa.  
 Schundler & Co., Inc., F. E., Long Island City, N. Y.  
 Standard Asbestos Mfg. Co., Chicago, Ill.  
 Standard Fuel Engineering Co., Detroit, Mich.  
 Tamms Silica Co., Chicago, Ill.  
 Walsh Refractories Corp., St. Louis, Mo.  
 Wilhelm Co., A., Reading, Pa.  
 Williamson Heater Co., Cincinnati, O.  
 Wilson, Inc., Grant, Chicago, Ill.

### CEMENT, ROOF

Acme Refining Co., Cleveland, O. (Liquid and plastic)  
 All States Roofers Equipment & Material Co., Chicago, Ill.  
 Barber Co., Inc., Philadelphia, Pa.  
 Barrett Co., New York City.  
 Bird & Son, Inc., East Walpole, Mass.  
 Calbar Paint & Varnish Co., Philadelphia, Pa.  
 Carey Co., Philip, Cincinnati, O.  
 Carter Paint Co., Liberty, Ind.  
 Certain-teed Products Corp., New York City.  
 Clinton Metallic Paint Co., Clinton, N. Y.  
 Connors Paint Mfg. Co., Wm., Troy, N. Y.  
 Continental Products Co., Euclid, O.  
 Ehret Magnesia Mfg. Co., Valley Forge, Pa.  
 Flintkote Co., New York City.  
 Glidden Co., Cleveland, O.  
 Hetzel Roofing Products Co., Newark, N. J.  
 Horn Co., A. C., Long Island City, N. Y.  
 Iowa Paint Mfg. Co., Des Moines, Ia. (Asphalt)  
 Johns-Manville, New York City.  
 Koppers Co., Tar and Chemical Div., Pittsburgh, Pa.  
 Lastik Products Co., Inc., Pittsburgh, Pa.  
 Miller & Son, C. Arthur, Elmira, N. Y.  
 National Mfg. Corp., Tonawanda, N. Y.  
 Ohmlac Paint & Refining Co., Chicago, Ill.  
 Pecora Paint Co., Philadelphia, Pa. (Asbestos)  
 Preasite Engineering Co., St. Louis, Mo.  
 • Pyrolite Products Co., Cleveland, O.

Ruberoid Co., New York City.  
 Rutland Fire Clay Co., Rutland, Vt.  
 Thompson & Co., Pittsburgh, Pa.  
 Tropical Paint & Oil Co., Cleveland, O.  
 United States Gypsum Co., Chicago, Ill.  
 Wilhelm Co., A., Reading, Pa.

### CHAIN, FURNACE

American Chain Co., Inc., Bridgeport, Conn.  
 • Bead Chain Mfg. Co., Bridgeport, Conn.  
 Bridgeport Chain & Mfg. Co., Bridgeport, Conn.  
 Chain Products Co., Cleveland, O.  
 Corbin Screw Corp., New Britain, Conn.  
 • Hart & Cooley Mfg. Co., Chicago, Ill.  
 Russell Mfg. Co., John M., Naugatuck, Conn.  
 Turner & Seymour Mfg. Co., Torrington, Conn.

### CHANNELS

*See Angles, Bars, Beams, Channels and Tees (Structural Shapes)*

### CLEANERS, VACUUM, FURNACE

American Radiator Co., New York City.  
 Arco Vacuum Corp., New York City.  
 Baker Furnace & Cleaner Mfg. Co., Toledo, O.  
 Barrett Mfg. Co., Kansas City, Mo.  
 • Breuer Electric Mfg. Co., Chicago, Ill.  
 • Brillion Furnace Co., Brillion, Wis.  
 Christie Cleaner Co., Cincinnati, O.  
 Densmore-Quinlan Co., Kenosha, Wis.  
 Dickson & Eddy, New York City.  
 • Electric Vacuum Cleaner Co., Inc., Cleveland, O.  
 • Grand Rapids Furnace Cleaner Co., Grand Rapids, Mich.  
 Holland Furnace Co., Holland, Mich. (Truck)  
 Ideal Commutator Dresser Co., Sycamore, Ill.  
 Kent Co., Inc., Rome, N. Y.  
 National Super Service Co., Toledo, O.  
 • Premier Division, Electric Vacuum Cleaner Co., Inc., Cleveland, O.  
 Ramey Mfg. Co., Columbus, O.  
 Root-Connersville Blower Corp., Connersville, Ind.  
 Spencer Turbine Co., Hartford, Conn.  
 Sturtevant Co., B. F., Hyde Park, Boston, Mass.  
 Swift Corp., Carl E., Holland, Mich.

### CLIPS, FASTENING, FOR ROOFING

American Sheet Metal Works, New Orleans, La.  
 Bridesburg Foundry Co., Philadelphia, Pa.  
 Edwards Mfg. Co., Inc., Cincinnati, O.  
 • Milcor Steel Co., Milwaukee, Wis.  
 • Osborn Co., J. M. & L. A., Cleveland, O.  
 Pfeifer, Wm., New York City.  
 Southbridge Roofing Co., Inc., Southbridge, Mass.

### CLIPS AND TIPS, DAMPER

Adams Co., Dubuque, Ia.  
 • Berger Bros. Co., Philadelphia, Pa.  
 Berger Mfg. Co., Div. of Republic Steel Corp., Canton, O.  
 Grand Rapids Die & Tool Co., Grand Rapids, Mich.  
 • Griswold Mfg. Co., Erie, Pa.  
 • Hart & Cooley Mfg. Co., Chicago, Ill.  
 Howes Co., S. M., Charlestown, Boston, Mass.  
 • Mueller Furnace Co., L. J., Milwaukee, Wis.  
 Stover Mfg. & Engine Co., Freeport, Ill.  
 • United States Register Co., Battle Creek, Mich.  
 • Young Regulator Co., Cleveland, O.

### COAL BURNERS, AUTOMATIC

*See Stokers*

### COATINGS, PROTECTIVE, METAL

Metalizing Co., Los Angeles, Cal.  
 White & Co., Haydn F., Cleveland, Ohio.

### COLD AIR FACES, METAL

*See Faces, Cold Air, Metal*

### COLD AIR FACES, WOOD

*See Faces, Cold Air, Wood*

### COILS, COOLING, DIRECT EXPANSION

Advanced Refrigerating Systems Co., Philadelphia, Pa.  
 • Aerofin Corp., Syracuse, N. Y.  
 Airecon Industries, Detroit, Mich.  
 • Baker Ice Machine Co., Inc., Omaha, Nebr.  
 Beacon-Morris Corp., Boston, Mass.  
 Bush Mfg. Co., Hartford, Conn.



Carbondale Division, Worthington Pump & Machinery Corp., Harrison, N. J.  
 Carrier Corp., Syracuse, N. Y.  
 •Clarage Fan Co., Kalamazoo, Mich.  
 Delco-Frigidaire Conditioning Div., General Motors Sales Corp., Dayton, O.  
 Fedders Mfg. Co., Buffalo, N. Y.  
 •Fox Furnace Co., Elyria, Ohio.  
 Frick Co., Inc., Waynesboro, Pa.  
 •G & O Mfg. Co., New Haven, Conn.  
 General Refrigeration Corporation, Beloit, Wis.  
 Kelvinator Corp., Detroit, Mich.  
 Kauffman Air Conditioning Corp., St. Louis, Mo.  
 McCord Radiator & Mfg. Co., Detroit, Mich.  
 McQuay, Inc., Minneapolis, Minn.  
 Mario Coil Co., St. Louis, Mo.  
 Modine Mfg. Co., Racine, Wis.  
 Nash Refrigeration Co., Inc., Newark, N. J.  
 Refrigeration Appliances, Inc., Chicago, Ill.  
 Reliance Refrigeration Machine Co., Chicago, Ill.  
 Rempe Coil Co., Chicago, Ill.  
 Rome-Turney Radiator Co., Rome, N. Y.  
 Serval, Inc., Evansville, Ind.  
 Standard Galvanizing Co., Chicago, Ill.  
 Stewart Ice Machine Co., Los Angeles, Cal.  
 Sturtevant Co., B. F., Hyde Park, Boston, Mass.  
 Thermal Units Mfg. Co., Meriden, Conn.  
 •Trane Co., La Crosse, Wis.  
 Trenton Auto Radiator Wks., Trenton, N. J.  
 Unit Heater & Cooler Co., Wausau, Wis.  
 Vilter Mfg. Co., Milwaukee, Wis.  
 Westinghouse Electric & Mfg. Co., Mansfield, O.  
 Whitlock Coil Pipe Co., Hartford, Conn.  
 Winchester Repeating Arms Co., New Haven, Conn.  
 Wing Mfg. Co., L. J., New York City  
 Wittenmeyer Machinery Co., Chicago, Ill.  
 XL Refrigerating Co., Inc., Chicago, Ill.  
 York Ice Machinery Corp., York, Pa.  
 Young Radiator Co., Racine, Wis.

### COILS, COOLING, WATER

Advanced Refrigerating Systems Co., Philadelphia, Pa.  
 •Aerofin Corp., Syracuse, N. Y.  
 Airecon Industries, Detroit, Mich.  
 American Blower Corp., Detroit, Mich.  
 •Baker Ice Machine Co., Inc., Omaha, Nebr.  
 Beacon-Morris Corp., Boston, Mass.  
 Bush Mfg. Co., Hartford, Conn.  
 Carbondale Division, Worthington Pump & Machinery Corp., Harrison, N. J.  
 Carrier Corp., Syracuse, N. Y.  
 •Clarage Fan Co., Kalamazoo, Mich.  
 Delco-Frigidaire Conditioning Div., General Motors Sales Corp., Dayton, O.  
 Fedders Mfg. Co., Buffalo, N. Y.  
 Frick Co., Inc., Waynesboro, Pa.  
 •G & O Mfg. Co., New Haven, Conn.  
 Handelan Washed Air Co., Minneapolis, Minn.  
 Kelvinator Corp., Detroit, Mich.  
 McCord Radiator & Mfg. Co., Detroit, Mich.  
 McQuay, Inc., Minneapolis, Minn.  
 Mario Coil Co., St. Louis, Mo.  
 Modine Mfg. Co., Racine, Wis.  
 Peerless of America, Inc., Chicago, Ill.  
 Refrigeration Appliances, Inc., Chicago, Ill.  
 Reliance Refrigeration Machine Co., Chicago, Ill.  
 Rempe Coil Co., Chicago, Ill.  
 Rome-Turney Radiator Co., Rome, N. Y.  
 Standard Galvanizing Co., Chicago, Ill.  
 Star Radiator Co., Los Angeles, Cal.  
 Sturtevant Co., B. F., Hyde Park, Boston, Mass.  
 Thermal Units Mfg. Co., Meriden, Conn.  
 •Trane Co., La Crosse, Wis.  
 Trenton Auto Radiator Wks., Trenton, N. J.  
 Unit Heater & Cooler Co., Wausau, Wis.  
 Vilter Mfg. Co., Milwaukee, Wis.  
 Whitlock Coil Pipe Co., Hartford, Conn.  
 XL Refrigerating Co., Inc., Chicago, Ill.  
 York Ice Machinery Corp., York, Pa.  
 Young Radiator Co., Racine, Wis.

### COILS, FIRE POT, HOT WATER

•Air Controls, Inc., Cleveland, O.  
 American Furnace & Foundry Co., Milan, Mich.  
 Beacon-Morris Corp., Boston, Mass.  
 Deshler Foundry & Machine Works, Deshler, O.  
 Devlin Mfg. Co., Thos., Burlington, N. J.  
 Dowagiac Steel Furnace Co., Dowagiac, Mich.  
 Excelso Products Corp., Buffalo, N. Y.  
 Globe Machinery & Supply Co., Des Moines, Ia.  
 Harvey-Whipple, Inc., Springfield, Mass.  
 Hotstream Heater Co., Cleveland, O.  
 Kitson Co., Philadelphia, Pa.  
 Liberty Foundry Co., St. Louis, Mo.  
 Marshall Furnace Co., Marshall, Mich.  
 Melbye Bros., Inc., Chicago, Ill.

Miller & Son, C. Arthur, Elmira, N. Y.  
 Mt. Vernon Furnace & Mfg. Co., Mt. Vernon, Ill.  
 •Mueller Furnace Co., L. J., Milwaukee, Wis.  
 Nugent Sons, Inc., Thos., New York City  
 Rempe Coil Co., Chicago, Ill.  
 Rudy Furnace Co., Dowagiac, Mich.

### COILS, HEATING

•Aerofin Corp., Syracuse, N. Y.  
 Airecon Industries, Detroit, Mich.  
 American Radiator Co., New York City  
 Andrews Lead Co., Inc., Long Island City, N. Y.  
 •Baker Ice Machine Co., Inc., Omaha, Nebr.  
 Bayley Blower Co., Milwaukee, Wis.  
 Bishop & Babcock Sales Co., Cleveland, O.  
 Bush Mfg. Co., Hartford, Conn.  
 Carrier Corp., Syracuse, N. Y.  
 •Clarage Fan Co., Kalamazoo, Mich.  
 Delco-Frigidaire Conditioning Div., General Motors Sales Corp., Dayton, O.  
 Economy Electric Mfg. Co., Cicero, Ill.  
 •G & O Mfg. Co., New Haven, Conn.  
 Kauffman Air Conditioning Corp., St. Louis, Mo.  
 McCord Radiator & Mfg. Co., Detroit, Mich.  
 McQuay, Inc., Minneapolis, Minn.  
 Mario Coil Co., St. Louis, Mo.  
 Modine Mfg. Co., Racine, Wis.  
 Montag Stove & Furnace Works, Portland, Ore.  
 Nelson Corp., Herman, Moline, Ill.  
 Nesbitt, Inc., John J., Philadelphia, Pa.  
 Peerless of America, Inc., Chicago, Ill.  
 Rempe Coil Co., Chicago, Ill.  
 Rome-Turney Radiator Co., Rome, N. Y.  
 Standard Galvanizing Co., Chicago, Ill.  
 Star Radiator Co., Los Angeles, Cal.  
 Sturtevant Co., B. F., Hyde Park, Boston, Mass.  
 Taco Heaters, Inc., New York, N. Y.  
 Thermal Units Mfg. Co., Meriden, Conn.  
 •Trane Co., La Crosse, Wis.  
 Trenton Auto Radiator Wks., Trenton, N. J.  
 Unit Heater & Cooler Co., Wausau, Wis.  
 York Ice Machinery Corp., York, Pa.  
 Young Radiator Co., Racine, Wis.

### COLLECTORS, BLOW PIPE

Airtherm Mfg. Co., St. Louis, Mo.  
 •American Air Filter Co., Inc., Louisville, Ky.  
 Bayley Blower Co., Milwaukee, Wis.  
 •Belanger Fan & Blower Co., Detroit, Mich.  
 Blower Application Co., Milwaukee, Wis.  
 Bubar, Hudson H., New York City.  
 •Buffalo Forge Co., Buffalo, N. Y.  
 •Clarage Fan Co., Kalamazoo, Mich.  
 Day Co., Minneapolis, Minn.  
 Dracco Corp., Cleveland, Ohio.  
 Falstrom Co., Passaic, N. J.  
 Garden City Fan Co., Chicago, Ill.  
 Goethel Sheet Metal Works, Alfred, Milwaukee, Wis.  
 Goethel Co., Alfred C., Milwaukee, Wis.  
 Grand Rapids Blow Pipe & Dust Arrester Co., Grand Rapids, Mich.  
 Industrial Sheet Metal Works, Inc., Detroit, Mich.  
 Kirk & Blum Mfg. Co., Cincinnati, O.  
 Lee & Son Co., Thomas, Cincinnati, O.  
 Mahon Co., R. C., Detroit, Mich.  
 Mellish & Murray Co., Chicago, Ill.  
 New York Blower Co., Chicago, Ill.  
 Northern Blower Co., Cleveland, Ohio.  
 Puhl & Hepper Mfg. Co., Inc., St. Louis, Mo.  
 Research Corp., New York City.  
 Sly Mfg. Co., W. W., Cleveland, O.  
 Sturtevant Co., B. F., Hyde Park, Boston, Mass.  
 Western Blower Co., Seattle, Wash.  
 Young & Bertke Co., Cincinnati, O.

### COMBUSTION CONTROLS

*See Controls, Combustion, Bonnet and Smoke Pipe*

### COMPOUNDS, CAULKING

Accurate Metal Weather Strip Co., New York City  
 Acme Refining Co., Cleveland, O.  
 Allmetal Weatherstrip Co., Chicago, Ill.  
 American Metal Weather Strip Co., Grand Rapids, Mich.  
 Asphalt Products Co., Syracuse, N. Y.  
 Calbar Paint & Varnish Co., Philadelphia, Pa.  
 Carey Co., Philip, Cincinnati, O.  
 Clinton Metallic Paint Co., Clinton, N. Y.  
 Continental Products Co., Euclid, O.  
 Diamond Metal Weather Strip Co., Columbus, O.  
 Eagle-Picher Lead Co., Cincinnati, O.  
 Horn Co., A. C., Long Island City, N. Y.  
 Iowa Paint Mfg. Co., Des Moines, Ia.



Johns-Manville, New York City  
 Lastik Products Co., Inc., Pittsburgh, Pa.  
 Ohmlac Paint & Refining Co., Chicago, Ill.  
 Pecora Paint Co., Philadelphia, Pa.  
 Plastic Products Co., Detroit, Mich.  
 ●Pyrolite Products Co., Cleveland, O.  
 Sauereisen Cements Co., Sharpsburg, Pa.  
 Thompson & Co., Pittsburgh, Pa.  
 Wilhelm Co., A., Reading, Pa.  
 Yardley Screen & Weather Strip Co., Columbus, O.

### COMPOUNDS, GLAZING

Acme Refining Co., Cleveland, O.  
 Calbar Paint & Varnish Co., Philadelphia, Pa.  
 Continental Products Co., Euclid, O.  
 Diamond Metal Weather Strip Co., Columbus, O.  
 Goodrich Co., B. F., Akron, O.  
 Horn Co., A. C., Long Island City, N. Y.  
 Lastik Products Co., Inc., Pittsburgh, Pa.  
 Pecora Paint Co., Philadelphia, Pa.  
 Plastic Products Co., Detroit, Mich.  
 ●Pyrolite Products Co., Cleveland, O.  
 Thompson & Co., Pittsburgh, Pa.

### COMPOUNDS, TINNING

American Solder & Flux Co., Philadelphia, Pa.  
 ●Burnley Battery & Mfg. Co., North East, Pa.  
 Eagle-Picher Lead Co., Cincinnati, O.  
 Lukens Metal Co., Thos. F., Philadelphia, Pa.  
 Minn-Koja Foundry & Mfg. Co., Fargo, N. Dak.  
 Potomac Mfg. Co., Philadelphia, Pa.  
 Ruby Chemical Co., Columbus, O.

### COMPOUNDS, WATER-PROOFING

Acorn Refining Co., Cleveland, Ohio.  
 American Barlock Co., Inc., Long Island City, N. Y.  
 Asphalt Products Co., Syracuse, N. Y.  
 Barber Co., Inc., Philadelphia, Pa.  
 Belmont Smelting & Refining Works, Inc., Brooklyn, N. Y.  
 Bird & Son, Inc., East Walpole, Mass.  
 Carey Co., Philip, Cincinnati, O.  
 Gerard Chemical Co., Elizabeth, N. J.  
 Lastik Products Co., Inc., Pittsburgh, Pa.  
 Pecora Paint Co., Philadelphia, Pa.  
 Plastic Products Co., Detroit, Mich.  
 Sauereisen Cements Co., Sharpsburg, Pa.  
 Self-Vulcanizing Rubber Co., Inc., Chicago, Ill.  
 Technical Coatings, Inc., New York City.  
 Thompson & Co., Pittsburgh, Pa.  
 Wilhelm Co., A., Reading, Pa.

### COMPRESSORS, REFRIGERATING

Advanced Refrigerating Systems Co., Philadelphia, Pa.  
 Builders Iron Foundry, Providence, R. I.  
 Airtemp, Inc., Dayton, O.  
 American Engineering Co., Philadelphia, Pa.  
 ●Baker Ice Machine Co., Inc., Omaha, Nebr.  
 Brunner Mfg. Co., Utica, N. Y.  
 Carbondale Division, Worthington Pump & Machinery Corp., Harrison, N. J.  
 Carrier Corp., Syracuse, N. Y.  
 Copeland Refrigeration Corp., Sidney, Ohio.  
 Curtis Refrigerating Machine Co., St. Louis, Mo.  
 De La Vergne Engine Co., Philadelphia, Pa.  
 Delco-Frigidaire Conditioning Div., General Motors Sales Corp., Dayton, O.  
 Fairbanks, Morse & Co., Chicago, Ill.  
 ●Fox Furnace Co., Elyria, Ohio.  
 Frick Co., Inc., Waynesboro, Pa.  
 ●General Electric Co., Schenectady, N. Y.  
 General Refrigeration Corporation, Beloit, Wis.  
 Hardy Mfg. Co., Dayton, O.  
 Ingersoll-Rand, New York City  
 Kauffman Air Conditioning Corp., St. Louis, Mo.  
 Kellogg Compressor & Mfg. Corp., Rochester, N. Y.  
 Kelvinator Corp., Detroit, Mich.  
 Merchant & Evans Co., Philadelphia, Pa.  
 Mills Novelty Co., Chicago, Ill.  
 Nash Refrigeration Co., Inc., Newark, N. J.  
 Norge Commercial Div. of Borg-Warner Corp., Detroit, Mich.  
 Reliance Refrigeration Machine Co., Chicago, Ill.  
 Serval, Inc., Evansville, Ind.  
 Stewart Ice Machine Co., Los Angeles, Cal.  
 Tecumseh Products Co., Tecumseh, Mich.  
 Uniflow Mfg. Co., Erie, Pa.  
 ●Universal Cooler Corp., Detroit, Mich.  
 Vilter Mfg. Co., Milwaukee, Wis.  
 Westinghouse Electric & Mfg. Co., Mansfield, O.  
 Williams Oil-O-Matic Heating Corp., Bloomington, Ill.  
 Wittenmeier Machinery Co., Chicago, Ill.  
 Wolfe Engineering & Mfg. Co., Harrisburg, Pa.  
 XL Refrigerating Co., Inc., Chicago, Ill.  
 York Ice Machinery Corp., York, Pa.

### CONDITIONERS, AIR

See Air Conditioning Units and Furnaces, Air Conditioning

### CONDUCTOR FITTINGS AND ACCESSORIES

See Fittings and Accessories, Conductor

### CONDUCTOR PIPE

See Pipe, Conductor

### CONTROLS, COMBINED FAN AND LIMIT

●Barber-Colman Co., Rockford, Ill.  
 ●Cook Electric Co., Chicago, Ill.  
 Detroit Lubricator Co., Detroit, Mich.  
 Fulton-Sylphon Co., Knoxville, Tenn.  
 Edison Electrical Controls Division, Thos. A. Edison, Inc., West Orange, N. J.  
 ●General Electric Co., Schenectady, N. Y.  
 Mercoid Corp., Chicago, Ill.  
 ●Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.  
 ●Penn Electric Switch Co., Goshen, Ind.  
 Perfex Corp., Milwaukee, Wis.  
 Spencer Thermostat Co., Attleboro, Mass.  
 Superstat Co., Springfield, Mass.  
 United Electric Controls Co., South Boston, Mass.  
 ●White Mfg. Co., St. Paul, Minn.

### CONTROLS, COMBUSTION, BONNET OR SMOKE-PIPE

●Barber-Colman Co., Rockford, Ill.  
 Bristol Co., Waterbury, Conn.  
 ●Cook Electric Co., Chicago, Ill.  
 Detroit Lubricator Co., Detroit, Mich.  
 Edison Electrical Controls Division, Thos. A. Edison, Inc., West Orange, N. J.  
 Hays Corp., Michigan City, Ind.  
 Jefferson Electric Co., Bellwood, Ill.  
 Mercoid Corp., Chicago, Ill.  
 ●Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.  
 ●Penn Electric Switch Co., Goshen, Ind.  
 Perfex Corp., Milwaukee, Wis.  
 Russell Electric Co., Chicago, Ill.  
 Teesdale Mfg. Co., Grand Rapids, Mich.  
 United Electric Controls Co., South Boston, Mass.  
 ●White Mfg. Co., St. Paul, Minn.

### CONTROLS, EFFECTIVE TEMPERATURE

●Barber-Colman Co., Rockford, Ill.  
 Friez & Sons, Inc., Julien P., Baltimore, Md.  
 Johnson Service Co., Milwaukee, Wis.  
 ●Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.  
 Powers Regulator Co., Chicago, Ill.

### CONTROLS, FAN

●Automatic Products Co., Milwaukee, Wis.  
 ●Barber-Colman Co., Rockford, Ill.  
 ●Cook Electric Co., Chicago, Ill.  
 Detroit Lubricator Co., Detroit, Mich.  
 Edison Electrical Controls Division, Thos. A. Edison, Inc., West Orange, N. J.  
 Fulton-Sylphon Co., Knoxville, Tenn.  
 ●General Electric Co., Schenectady, N. Y.  
 ●Gleason-Avery, Inc., Auburn, N. Y.  
 Jefferson Electric Co., Bellwood, Ill.  
 Mercoid Corp., Chicago, Ill.  
 ●Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.  
 ●Pacific Gas Radiator Co., Los Angeles, Cal.  
 Paragon Electric Co., Chicago, Ill.  
 ●Peerless Electric Co., Warren, O.  
 ●Penn Electric Switch Co., Goshen, Ind.  
 Perfex Corp., Milwaukee, Wis.  
 Russell Electric Co., Chicago, Ill.  
 Spencer Thermostat Co., Attleboro, Mass.  
 Superstat Co., Springfield, Mass.  
 Taylor Instrument Companies, Rochester, N. Y.  
 United Electric Controls Co., South Boston, Mass.  
 ●White Mfg. Co., St. Paul, Minn.  
 White-Rodgers Electric Co., St. Louis, Mo.

### CONTROLS, HEATING, VENTILATING AND AIR CONDITIONING SYSTEMS, PNEUMATIC

Bristol Co., Waterbury, Conn.  
 Foxboro Co., Foxboro, Mass.  
 Johnson Service Co., Milwaukee, Wis.  
 ●Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.  
 National Regulator Co., Chicago, Ill.  
 Powers Regulator Co., Chicago, Ill.  
 Taylor Instrument Companies, Rochester, N. Y.

**CONTROLS, LIMIT**

- Automatic Products Co., Milwaukee, Wis.
- Barber-Colman Co., Rockford, Ill.
- Cook Electric Co., Chicago, Ill.
- Detroit Lubricator Co., Detroit, Mich.
- Edison Electrical Controls Division, Thos. A. Edison, Inc., West Orange, N. J.
- General Controls Co., San Francisco, Cal., and Cleveland, O.
- Gleason-Avery, Inc., Auburn, N. Y.
- Jefferson Electric Co., Bellwood, Ill.
- McCorkle Co., D. H., Berkeley, Cal.
- Mercoid Corp., Chicago, Ill.
- Micro Switch Corp., Freeport, Ill.
- Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
- Pacific Gas Radiator Co., Los Angeles, Cal.
- Penn Electric Switch Co., Goshen, Ind.
- Perfex Corp., Milwaukee, Wis.
- Russell Electric Co., Chicago, Ill.
- Sheer Co., H. M., Quincy, Ill.
- Spencer Thermostat Co., Attleboro, Mass.
- United Electric Controls Co., South Boston, Mass.
- White Mfg. Co., St. Paul, Minn.

**CONTROLS, OIL BURNER, COMPLETE ASSEMBLY**

- Barber-Colman Co., Rockford, Ill.
- Cook Electric Co., Chicago, Ill.
- Detroit Lubricator Co., Detroit, Mich.
- General Electric Co., Schenectady, N. Y.
- McCorkle Co., D. H., Berkeley, Cal.
- Mercoid Corp., Chicago, Ill.
- Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
- Penn Electric Switch Co., Goshen, Ind.
- Perfex Corp., Milwaukee, Wis.
- White-Rodgers Electric Co., St. Louis, Mo.

**CONTROLS, STOKER, COMPLETE ASSEMBLY**

- Barber-Colman Co., Rockford, Ill.
- Cook Electric Co., Chicago, Ill.
- Detroit Lubricator Co., Detroit, Mich.
- General Electric Co., Schenectady, N. Y.
- Industrial Engineering Corp., Evansville, Ind.
- Kisco Co., Inc., St. Louis, Mo.
- Mercoid Corp., Chicago, Ill.
- Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
- Paragon Electric Co., Chicago, Ill.
- Penn Electric Switch Co., Goshen, Ind.
- Perfex Corp., Milwaukee, Wis.
- Russell Electric Co., Chicago, Ill.
- Spencer Thermostat Co., Attleboro, Mass.
- White-Rodgers Electric Co., St. Louis, Mo.

**CONTROLS, WINDOW CONDENSATION**

Friez & Sons, Inc., Julien P., Baltimore, Md.

**COOLING SURFACE**

*See Coils, Cooling, Water*

**COPPER TUBING**

*See Tubing, Copper*

**COPPERS, SOLDERING**

- Berger Mfg. Co., Div. of Republic Steel Corp., Canton, O.
- Bernz Co., Inc., Otto, Rochester, N. Y.
- Downs-Smith Brass & Copper Co., New York City.
- Electric Materials Co., North East, Pa.
- Electric Soldering Iron Co., Inc., New York City
- Everhot Mfg. Co., Maywood, Ill.
- Gasweld & Airway, Inc., Chicago, Ill. (Acetylene)
- General Electric Co., Schenectady, N. Y.
- Hussey & Co., C. G., Pittsburgh, Pa.
- Ideal Commutator Dresser Co., Sycamore, Ill.
- Linde Air Products Co., New York City.
- Minn-Kota Foundry & Mfg. Co., Fargo, N. Dak.
- Peck, Stow & Wilcox Co., Southington, Conn.
- Revere Copper and Brass Incorporated, New York City.
- Sight Feed Generator Co., Richmond, Ind.
- Stanley Rule & Level Plant, New Britain, Conn.
- Turner Brass Works, Sycamore, Ill.

**CORNICES**

- American Sheet Metal Works, New Orleans, La.
- Berger Bros. Co., Philadelphia, Pa.
- Berger Mfg. Co., Div. of Republic Steel Corp., Canton, O.
- Biersach & Niedermeyer Co., Milwaukee, Wis.
- Brooklyn Metal Ceiling Co., Brooklyn, N. Y.
- California Cornice, Steel and Supply Corp., Los Angeles, Cal.
- Chicago Metal Mfg. Co., Chicago, Ill.
- Danzer Metal Works Co., Hagerstown, Md.
- Decatur Iron & Steel Co., Decatur, Ala.

- Edwards Mfg. Co., Inc., Cincinnati, O.
- Herrmann & Grace Co., Brooklyn, N. Y.
- International Steel Co., Evansville, Ind.
- La Crosse Steel Roofing & Corrugating Co., La Crosse, Wis.
- Lamb & Ritchie Co., Cambridge, Mass.
- Ledkote Products Co., Long Island City, N. Y.
- Martin Metal Mfg. Co., Wichita, Kan.
- Milcor Steel Co., Milwaukee, Wis.
- Miller & Doing, Inc., Brooklyn, N. Y.
- Norman Sheet Metal Mfg. Co., W. F., Nevada, Mo.
- Park City Cornice Works, Inc., Bridgeport, Conn.
- Perkinson & Brown, Chicago, Ill.
- Perrin Co., Edward C., Camden, N. J.
- Providence Cornice Co., Providence, R. I.
- Ryniker Sheet Metal Works, Inc., Billings, Mont.
- St. Paul Corrugated Co., St. Paul, Minn.
- Schoedinger Co., F. O., Columbus, O.
- Southbridge Roofing Co., Inc., Southbridge, Mass.
- Van Noorden Co., E., Boston, Mass.
- Watson Co., Inc., Jas. H., Bradley, Ill.
- Willis Mfg. Co., Galesburg, Ill.
- York Corrugating Co., York, Pa.

**COUPLINGS, FLEXIBLE, POWER TRANSMISSION**

- Chicago Die Casting Co., Chicago, Ill.
- Congress Tool & Die Co., Detroit, Mich.
- Crocker-Wheeler Electric Mfg. Co., Ampere, N. J.
- De Laval Steam Turbine Co., Trenton, N. J.
- Dick Co., Inc., R. & J., Passaic, N. J.
- General Blower Co., Philadelphia, Pa.
- Lovejoy Flexible Coupling Co., Chicago, Ill.
- Medart Co., St. Louis, Mo.
- Wood's Sons Co., T. B., Chambersburg, Pa.

**CRACKLE FINISH PAINT**

*See Paint, Crackle Finish*

**CRIMPERS**

*See Tools, Metal Workers'*

**DAMPER MOTORS**

*See Motors, Damper, Furnace Draft, Electrical*

**DAMPERS, DUCT**

- Acme Tin Plate & Roofing Supply Co., Philadelphia, Pa.
- Airecon Industries, Detroit, Mich.
- American Foundry & Furnace Co., Bloomington, Ill.
- Belanger Fan & Blower Co., Detroit, Mich.
- Bishop & Babcock Sales Co., Cleveland, O.
- Economy Electric Mfg. Co., Cicero, Ill.
- Excelsior Steel Furnace Co., Chicago, Ill.
- Hampden Cornice Works, Springfield, Mass.
- Howes Co., S. M., Charlestown, Boston, Mass.
- Industrial Sheet Metal Works, Inc., Detroit, Mich.
- Iona Ventilator Co., Inc., Philadelphia, Pa.
- Jacobs Co., B. & J., Cincinnati, O.
- Jamar Co., Walker, Duluth, Minn.
- Johnson Service Co., Milwaukee, Wis.
- Kirk & Blum Mfg. Co., Cincinnati, O.
- Maysteel Products, Inc., Mayville, Wis.
- Mercoid Corp., Chicago, Ill.
- Mueller Furnace Co., L. J., Milwaukee, Wis.
- Ohio Products Co., Cleveland, O.
- Phillips Heating, Ventilating & Mfg. Co., Los Angeles, Cal.
- Young Regulator Co., Cleveland, O.

**DAMPERS, SMOKE PIPE**

- Adams Co., Dubuque, Ia.
- Brauer Supply Co., A. G., St. Louis, Mo.
- Burt Mfg. Co., Akron, O.
- Grand Rapids Die & Tool Co., Grand Rapids, Mich.
- Griswold Mfg. Co., Erie, Pa.
- Hart & Cooley Mfg. Co., Chicago, Ill.
- Jacobs Co., B. & J., Cincinnati, O.
- Jewett Stove & Foundry Corp., Buffalo, N. Y.
- Liberty Foundry Co., St. Louis, Mo.
- Littleford Bros., Cincinnati, O.
- Martin Metal Mfg. Co., Wichita, Kan.
- Mueller Furnace Co., L. J., Milwaukee, Wis.
- Perfect Burner Co., Lynn, Mass.
- Preferred Utilities Manufacturing Corp., New York City.
- Royal-Apex Mfg. Corp., Brooklyn, N. Y.
- Schoedinger, F. O., Co., Columbus, O.
- Stove Mfg. & Engine Co., Freeport, Ill.
- United States Register Co., Battle Creek, Mich.
- Walker Mfg. & Sales Corp., St. Joseph, Mo.
- Watson Co., Inc., Jas. H., Bradley, Ill.
- Williamson Heater Co., Cincinnati, O.

**DEEP WELL PUMPS**

*See Pumps, Deep Well*

**DIES AND PRESSES***See Presses and Dies***DOORS, HOLLOW METAL**

American Sheet Metal Works, New Orleans, La.  
 Bayer Co., A. J., Los Angeles, Cal.  
 Biersach & Niedermeyer Co., Milwaukee, Wis.  
 Edwards Mfg. Co., Inc., Cincinnati, O.  
 Falstrom Co., Passaic, N. J.  
 International Steel Co., Evansville, Ind.  
 Maysteel Products, Inc., Mayville, Wis.  
 Metal Door & Trim Co., La Porte, Ind.  
 Newman Brothers, Inc., Cincinnati, O.  
 Perkinson & Brown, Chicago, Ill.  
 Providence Cornice Co., Providence, R. I.  
 Truscon Steel Co., Youngstown, O.

**DOORS, KALAMEIN**

American Sheet Metal Works, New Orleans, La.  
 Biersach & Niedermeyer Co., Milwaukee, Wis.  
 California Cornice, Steel and Supply Corp., Los Angeles, Cal.  
 Cincinnati Mfg. Co., Cincinnati, O.  
 Edwards Mfg. Co., Inc., Cincinnati, O.  
 Empire Door Co., Inc., New York City  
 Herrmann & Grace Co., Brooklyn, N. Y.  
 International Steel Co., Evansville, Ind.  
 Lee & Son Co., Thomas, Cincinnati, O.  
 Mahon Co., R. C., Detroit, Mich.  
 Mesker & Co., Geo. L., Evansville, Ind.  
 Newman Brothers, Inc., Cincinnati, O.  
 Perkinson & Brown, Chicago, Ill.  
 Providence Cornice Co., Providence, R. I.  
 Richmond Fireproof Door Co., Syracuse, N. Y.  
 Syracuse Fire Door Corp., Syracuse, N. Y.  
 Van Noorden Co., E., Boston, Mass.  
 World Kalamein Sash & Door Corp., New York City

**DOORS AND SHUTTERS, FIRE**

American Sheet Metal Works, New Orleans, La.  
 Bards Range & Foundry Co., E. H., Cincinnati, O.  
 Biersach & Niedermeyer Co., Milwaukee, Wis.  
 Cornell Iron Works, Inc., Long Island City, N. Y.  
 Detroit Steel Products Co., Detroit, Mich.  
 Edwards Mfg. Co., Inc., Cincinnati, O.  
 Empire Door Co., Inc., New York City.  
 Falstrom Co., Passaic, N. J.  
 Herrmann & Grace Co., Brooklyn, N. Y.  
 Industrial Sheet Metal Works, Inc., Detroit, Mich.  
 International Steel Co., Evansville, Ind.  
 Kinnear Mfg. Co., Columbus, O.  
 Mahon Co., R. C., Detroit, Mich.  
 Maysteel Products, Inc., Mayville, Wis.  
 Merchant & Evans Co., Philadelphia, Pa.  
 Mesker & Co., Geo. L., Evansville, Ind.  
 Perkinson & Brown, Chicago, Ill.  
 Providence Cornice Co., Providence, R. I.  
 Richards-Wilcox Mfg. Co., Aurora, Ill.  
 Richmond Fireproof Door Co., Richmond, Ind.  
 Saino Mfg. Co., Inc., F. L., Memphis, Tenn.  
 St. Paul Corrugating Co., St. Paul, Minn.  
 Schoedinger, F. O., Co., Columbus, O.  
 Southbridge Roofing Co., Inc., Southbridge, Mass.  
 Syracuse Fire Door Corp., Syracuse, N. Y.  
 Van Noorden Co., E., Boston, Mass.  
 Western Wire & Iron Works, Inc., Chicago, Ill.  
 Wheeling Corrugating Co., Wheeling, W. Va.  
 Willis Mfg. Co., Galesburg, Ill.

**DRAFT GAGES***See Gages, Draft***DRAFT REGULATORS***See Regulators, Furnace Draft, Mechanical***DRILLS, ELECTRIC, PORTABLE**

Black & Decker Mfg. Co., Towson, Md.  
 Clark Jr., Electric Co., Jas., Louisville, Ky.  
 Excelso Products Corp., Buffalo, N. Y.  
 Ideal Commutator Dresser Co., Sycamore, Ill.  
 Independent Pneumatic Tool Co., Chicago, Ill.  
 Mall Tool Co., Chicago, Ill.  
 Misener Mfg. Co., Inc., Syracuse, N. Y.  
 Power King Tool Corp., Warsaw, Ind.  
 Signal Electric Mfg. Co., Menominee, Mich.  
 • Skilsaw, Inc., Chicago, Ill.  
 Speedway Mfg. Co., Cicero, Ill.  
 Stanley Electric Tool Div., The Stanley Works, New Britain, Conn.  
 • Wodack Electric Tool Corp., Chicago, Ill.

**DUCTS AND FITTINGS, PREFABRICATED**

Acer & Whedon, Inc., Medina, N. Y.  
 Acme Tin Plate and Roofing Supply Co., Philadelphia, Pa.  
 Champion Furnace Pipe Co., Peoria, Ill.  
 • Chandler Co., Cedar Rapids, Ia.  
 Char-Gale Mfg. Co., Minneapolis, Minn.  
 Cincinnati Sheet Metal & Roofing Co., Cincinnati, O.  
 Corbman Bros., Inc., Philadelphia, Pa.  
 Excelsior Steel Furnace Co., Chicago, Ill.  
 Falstrom Co., Passaic, N. J.  
 Gerstein & Cooper, South Boston, Mass.  
 • Henry Furnace & Foundry Co., Cleveland, O.  
 • Lamneck Products, Inc., Columbus, O.  
 Maysteel Products, Inc., Mayville, Wis.  
 • Meyer & Bro. Co., F., Peoria, Ill.  
 • Milcor Steel Co., Milwaukee, Wis.  
 Monerlef Furnace Co., Atlanta, Ga.  
 Reynolds Corp., New York City.

**EAVES TROUGH FITTINGS AND ACCESSORIES***See Fittings and Accessories, Eaves Trough and Gutter***EAVES TROUGH AND GUTTERS**

American Sheet Metal Works, New Orleans, La.  
 Ames Co., W. R., San Francisco, Cal.  
 Anderson Mfg. Co., Des Moines, Ia.  
 Barnes Metal Products Co., Chicago, Ill.  
 • Berger Bros. Co., Philadelphia, Pa.  
 Berger Mfg. Co., Div. of Republic Steel Corp., Canton, O.  
 Braden Mfg. Co., Terre Haute, Ind.  
 Bridesburg Foundry Co., Philadelphia, Pa.  
 Chase Brass & Copper Co., Inc., Waterbury, Conn.  
 Chicago Metal Mfg. Co., Chicago, Ill.  
 Cincinnati Sheet Metal & Roofing Co., Cincinnati, O.  
 Danzer Metal Works Co., Hagerstown, Md.  
 Decatur Iron & Steel Co., Decatur, Ala.  
 Downs-Smith Brass & Copper Co., New York City.  
 Edwards Mfg. Co., Inc., Cincinnati, O.  
 • Hussey & Co., C. G., Pittsburgh, Pa.  
 Klauer Mfg. Co., Dubuque, Ia.  
 La Crosse Steel Roofing & Corrugating Co., La Crosse, Wis.  
 Lamb & Ritchie Co., Cambridge, Mass.  
 Ledkote Products Co., Long Island City, N. Y.  
 Lyman Co., H. B., Southampton, Mass.  
 • Lyon, Conklin & Co., Inc., Baltimore, Md.  
 Martin Metal Mfg. Co., Wichita, Kan.  
 • Milcor Steel Co., Milwaukee, Wis. (Square Hanging)  
 Miller & Doing, Inc., Brooklyn, N. Y.  
 New Delphos Mfg. Co., Delphos, O.  
 Norman Sheet Metal Mfg. Co., W. F., Nevada, Mo.  
 • Osborn Co., J. M. & L. A., Cleveland, O.  
 Providence Cornice Co., Providence, R. I.  
 Reeves Steel & Mfg. Co., Dover, O.  
 Ryniker Sheet Metal Works, Inc., Billings, Mont.  
 St. Paul Corrugating Co., St. Paul, Minn.  
 Schoedinger, F. O., Co., Columbus, O.  
 Sheet Metal Products Co., Peoria, Ill.  
 Southbridge Roofing Co., Inc., Southbridge, Mass.  
 Tiffin Art Metal Co., Tiffin, O.  
 Van Noorden Co., E., Boston, Mass.  
 Watson Co., Inc., Jas. H., Bradley, Ill.  
 Wheeling Corrugating Co., Wheeling, W. Va.  
 Wheeling Metal & Mfg. Co., Wheeling, W. Va.  
 Willis Mfg. Co., Galesburg, Ill.  
 Woolwine Metal Products Co., Los Angeles, Cal.  
 York Corrugating Co., York, Pa.

**EFFECTIVE TEMPERATURE CONTROLS***See Controls, Effective Temperature***ELBOW MACHINES***See Machines, Elbow***ELBOWS, BLOW PIPE***See Fittings, Blow Pipe***ELBOWS, CONDUCTOR***See Fittings and Accessories, Conductor***ELBOWS, FURNACE PIPE***See Fittings and Accessories, Furnace Pipe***ELECTRIC DRILLS***See Drills, Electric, Portable***ELECTRIC SHEARS***See Shears, Portable, Electric***ELECTRIC WELDERS***See Welders, Arc, Spot*



**ELECTRICAL RELAYS***See Relays, Electrical***ELECTRODES, ARC WELDING**

- Air Reduction Sales Co., New York City
- Allegheny Steel Co., Brackenridge, Pa.
- American Brass Co., Waterbury, Conn.
- American Chain Co., Inc., Bridgeport, Conn.
- American Steel & Wire Co., Chicago, Ill.
- Central Steel & Wire Co., Chicago, Ill.
- Chicago Steel & Wire Co., Chicago, Ill.
- Crucible Steel Co. of America, New York City.
- General Electric Co., Schenectady, N. Y.
- Hollup Corp., Chicago, Ill.
- Imperial Brass Mfg. Co., Chicago, Ill.
- Keasbey & Mattison Co., Ambler, Pa.
- Lee & Son Co., K. O., Aberdeen, S. D.
- Lincoln Electric Co., Cleveland, O.
- Marquette Mfg. Co., Inc., Minneapolis, Minn.
- Maurath, Inc., Cleveland, O.
- Roebbing's Sons Co., John A., Trenton, N. J.
- Ryerson & Son, Inc., Jos. T., Chicago, Ill.
- Sight Feed Generator Co., Richmond, Ind.
- Torchweld Equipment Co., Chicago, Ill.
- Universal Power Corp., Cleveland, O.
- Westinghouse Electric & Mfg. Co., Mansfield, O.
- Wilson Welder & Metals Co., Inc., North Bergen, N. J.

**ENAMELS & LACQUERS**

- Debevoise Co., Brooklyn, N. Y.
- du Pont de Nemours & Co., E. I., R. & H. Chemicals Dept., Wilmington, Del.
- Hilo Varnish Co., Brooklyn, N. Y.
- Maas & Waldstein Co., Newark, N. J.
- Pierce & Stevens, Inc., Buffalo, N. Y.
- Zapon-Brevolite Division Atlas Powder Co., North Chicago, Ill.

**FACES, COLD AIR, METAL**

- American Foundry & Furnace Co., Bloomington, Ill.
- Auer Register Co., Cleveland, O.
- Best Register Co., Milwaukee, Wis.
- Diamond Mfg. Co., Wyoming, Pa.
- Forest City Foundries Co., Cleveland, O.
- Gillian Mfg. Co., Ferndale, Michigan.
- Hart & Cooley Mfg. Co., Chicago, Ill.
- Hendrick Mfg. Co., Carbondale, Pa.
- Independent Register Co., Cleveland, O.
- Keith Furnace Co., Des Moines, Ia. (Cast)
- Lamneck Products, Inc., Columbus, O.
- Liberty Foundry Co., St. Louis, Mo.
- Lyon, Conklin & Co., Inc., Baltimore, Md.
- Mueller Furnace Co., L. J., Milwaukee, Wis.
- Register & Grille Mfg. Co., Inc., Brooklyn, N. Y.
- Roberts-Hamilton Co., Minneapolis, Minn.
- Rock Island Register Co., Rock Island, Ill.
- Tuttle & Bailey, Inc., New Britain, Conn.
- United States Register Co., Battle Creek, Mich.
- Waterloo Register Co., Waterloo, Ia.
- Williamson Heater Co., Cincinnati, O.

**FACES, COLD AIR, WOOD**

- American Wood Register Co., Plymouth, Ind.
- Antigo Building Supply Co., Antigo, Wis.
- Best Register Co., Milwaukee, Wis.
- Eaglesfield Ventilator Co., Indianapolis, Ind.
- Garber Lumber & Construction Co., Strasburg, O.
- Lyon, Conklin & Co., Inc., Baltimore, Md.
- Marsh Lumber Co., Dover, O.
- McClure Builders' Supply Co., East Palestine, O.
- Register & Grille Mfg. Co., Inc., Brooklyn, N. Y.
- Rock Island Register Co., Rock Island, Ill.
- Tiffin Art Metal Co., Tiffin, O.
- United States Register Co., Battle Creek, Mich.
- Wooster Art Wood, Inc., Wooster, O.

**FANS, BOOSTER, COLD AIR RETURN**

- A-C Mfg. Co., Pontiac, Ill.
- Advance Aluminum Castings Corp., Chicago, Ill.
- Aerovent Fan Co., Piqua, O.
- Aire-Folle Fan & Blower Company, Detroit, Mich.
- American Blower Corp., Detroit, Mich.
- Autovent Fan Co., Piqua, O.
- Autovent Fan & Blower Co., Chicago, Ill.
- Berns Specialty Co., Chicago, Ill.
- Brumme Mfg. Co., Chicago, Ill.
- Buffalo Forge Co., Buffalo, N. Y.
- Cary Mfg. Co., Waupaca, Wis.
- Champion Blower & Forge Co., Lancaster, Pa.
- De Bothezat Ventilating Equipment Division, American Machine & Metals, Inc., New York City.
- Economy Electric Mfg. Co., Cicero, Ill.
- Electrogas Furnace & Mfg. Co., San Francisco, Cal.
- Electrovent Fan & Mfg. Co., Chicago, Ill.

- Foret-Air Co., Rockford, Ill.
- General Regulator Corp., Chicago, Ill.
- International Engineering, Inc., Dayton, O.
- Peerless Electric Co., Warren, O.
- Roan Mfg. Co., Racine, Wis.
- Sturtevant Co., B. F., Hyde Park, Boston, Mass.
- Universal Blower Co., Birmingham, Mich.
- Western Blower Co., Seattle, Wash.

**FANS, BOOSTER, ONE-PIPE WARM AIR**

- Aire-Folle Fan & Blower Co., Detroit, Mich.
- American Blower Corp., Detroit, Mich.
- American Foundry & Furnace Co., Bloomington, Ill.
- Brumme Mfg. Co., Chicago, Ill.
- Champion Blower & Forge Co., Lancaster, Pa.
- Economy Electric Mfg. Co., Cicero, Ill.
- Foret-Air Co., Rockford, Ill.
- Meier Electric & Machine Co., Indianapolis, Ind.
- Victor Electric Products, Inc., Cincinnati, O.

**FANS, FURNACE, PROPELLER TYPE**

- Advance Aluminum Castings Corp., Chicago, Ill.
- Aerovent Fan Co., Piqua, O.
- Air Controls, Inc., Cleveland, O.
- Aire-Folle Fan & Blower Co., Detroit, Mich.
- American Coolair Corp., Jacksonville, Fla.
- American Foundry & Furnace Co., Bloomington, Ill.
- Arex Co., Chicago, Ill.
- Autovent Fan & Blower Co., Chicago, Ill.
- Belanger Fan & Blower Co., Detroit, Mich.
- Buffalo Forge Co., Buffalo, N. Y.
- Campbell Heating Co., Des Moines, Ia.
- Campbell Heating Co., E. K., Kansas City, Mo.
- Champion Blower & Forge Co., Lancaster, Pa.
- Chicago Steel Furnace Co., Chicago, Ill.
- Columbus Heating & Ventilating Co., Columbus, O.
- De Bothezat Ventilating Equipment Division, American Machine & Metals, Inc., New York City.
- Economy Electric Manufacturing Co., Cicero, Ill.
- Electrovent Fan & Mfg. Co., Chicago, Ill.
- Foret-Air Co., Rockford, Ill.
- Fraser Furnace Co., Inc., Stockton, Cal.
- Garden City Fan Co., Chicago, Ill.
- General Blower Co., Philadelphia, Pa.
- General Regulator Corp., Chicago, Ill.
- Haynes Furnace Fan Co., Kansas City, Mo.
- Henry Furnace & Foundry Co., Cleveland, O.
- Home Furnace Co., Holland, Mich.
- International Engineering, Inc., Dayton, O.
- Johnston Co., Wm. W., Dayton, O.
- Lennox Furnace Co., Marshalltown, Ia.
- McPherson Furnace & Supply Co., Portland, Ore.
- Majestic Co., Huntington, Ind.
- Meier Electric & Machine Co., Indianapolis, Ind.
- Mohr-Air Co., Marion, O.
- New York Blower Co., Chicago, Ill.
- Peerless Electric Co., Warren, O.
- Propellair, Inc., Springfield, O.
- Reed Unit-Fans, Inc., New Orleans, La.
- Russell Electric Co., Chicago, Ill.
- Schwitzer-Cummins Co., Indianapolis, Ind.
- Sturtevant Co., B. F., Hyde Park, Boston, Mass.
- Universal Blower Co., Birmingham, Mich.
- Utility Fan & Mfg. Co., Los Angeles, Cal.
- Victor Electric Products, Inc., Cincinnati, O.
- Western Blower Co., Seattle, Wash.
- Wing Mfg. Co., L. J., New York City.

**FANS, KITCHEN EXHAUST**

- Aerovent Fan Co., Piqua, O.
- Air Conditioning Products Co., Detroit, Mich.
- Aire-Folle Fan & Blower Co., Detroit, Mich.
- Airmaster Corp., Chicago, Ill.
- Allen Corp., Detroit, Mich.
- American Blower Corp., Detroit, Mich.
- American Coolair Corp., Jacksonville, Fla.
- Arex Co., Chicago, Ill.
- Autovent Fan & Blower Co., Chicago, Ill.
- Barrett Engineers, Cleveland Heights, O.
- Belanger Fan & Blower Co., Detroit, Mich.
- Berns Specialty Co., Chicago, Ill.
- Bishop & Babcock Sales Co., Cleveland, O.
- Buffalo Forge Co., Buffalo, N. Y.
- Champion Blower & Forge Co., Lancaster, Pa.
- Clarage Fan Co., Kalamazoo, Mich.
- De Bothezat Ventilating Equipment Division, American Machine & Metals, Inc., New York City.
- Diehl Mfg. Co., Elizabeth, N. J.
- Electrovent Corp., Detroit, Mich.
- Electrovent Fan & Mfg. Co., Chicago, Ill.
- Economy Electric Manufacturing Co., Cicero, Ill.
- Emerson Electric Mfg. Co., St. Louis, Mo.
- Foret-Air Co., Rockford, Ill.
- Garden City Fan Co., Chicago, Ill.
- Gas City Glass Co., Gas City, Ind.
- General Blower Co., Philadelphia, Pa.
- General Electric Co., Schenectady, N. Y.

- General Regulator Corp., Chicago, Ill.
- Hirschman Co., Inc., W. F., Buffalo, N. Y.
- International Engineering, Inc., Dayton, O.
- Jordan & Co., Paul R., Indianapolis, Ind.
- King Ventilating Co., Owatonna, Minn.
- Meier Electric & Machine Co., Indianapolis, Ind.
- Midwest Ventilating Works, Milwaukee, Wis.
- Myers Electric Co., Pittsburgh, Pa.
- Nelson Corp., Herman, Moline, Ill.
- New York Blower Co., Chicago, Ill.
- Peerless Electric Co., Warren, O.
- Propellair, Inc., Springfield, O.
- Pryne & Co., Inc., Los Angeles, Cal.
- Reed Unit-Fans, Inc., New Orleans, La.
- Robbins & Myers, Inc., Springfield, O.
- Russell Insulation Co., F. C., Baltimore, Md.
- Signal Electric Mfg. Co., Menominee, Mich.
- Sturtevant Co., B. F., Hyde Park, Boston, Mass.
- Universal Blower Co., Birmingham, Mich.
- Utility Fan & Mfg. Co., Los Angeles, Cal.
- Victor Electric Products, Inc., Cincinnati, O.
- Wagner Electric Corp., St. Louis, Mo.
- Ward Mfg. Co., Detroit, Mich.
- Western Blower Co., Seattle, Wash.
- Westinghouse Electric & Mfg. Co., Mansfield, O.
- Utility Fan & Mfg. Co., Los Angeles, Cal.

### FANS, NIGHT AIR COOLING, COMPLETE UNIT

- Air Controls Inc., Cleveland, O.
- Aire-Foile Fan & Blower Co., Detroit, Mich.
- Airmaster Corp., Chicago, Ill.
- Allen Corporation, Detroit, Mich.
- American Blower Corp., Detroit, Mich.
- American Coolair Corp., Jacksonville, Fla.
- Auburn Automobile Co., Air Cond. Div., Chicago, Ill., and Connorsville, Ind.
- Autovent Fan & Blower Co., Chicago, Ill.
- Belanger Fan & Blower Co., Detroit, Mich.
- Bishop & Babcock Sales Co., Cleveland, O.
- Buffalo Forge Co., Buffalo, N. Y.
- Champion Blower & Forge Co., Lancaster, Pa.
- Delco-Frigidaire Conditioning Div., General Motors Sales Corp., Dayton, O.
- Economy Electric Mfg. Co., Cicero, Ill.
- Electrovent Fan & Mfg. Co., Chicago, Ill.
- General Blower Co., Philadelphia, Pa.
- General Regulator Corp., Chicago, Ill.
- Hirschman Co., Inc., W. F., Buffalo, N. Y.
- International Engineering, Inc., Dayton, O.
- Iona Ventilator Co., Inc., Philadelphia, Pa.
- Johnson Fan & Blower Corp., Chicago, Ill.
- King Ventilating Co., Owatonna, Minn.
- Kisco Company, Inc., St. Louis, Mo.
- Lau Blower Co., Dayton, O.
- Marathon Electric Mfg. Corp., Wausau, Wis.
- Meier Electric & Machine Co., Indianapolis, Ind.
- Mellish & Murray Co., Chicago, Ill.
- New York Blower Co., Chicago, Ill.
- Norge Heating & Conditioning Div., Borg-Warner Corp., Detroit, Mich.
- Peerless Electric Co., Warren, O.
- Propellair, Inc., Springfield, O.
- Reed Unit-Fans, Inc., New Orleans, La.
- Reynolds Corp., New York City.
- Robbins & Myers, Inc., Springfield, O.
- Russell Insulation Co., F. C., Baltimore, Md.
- Sturtevant Co., B. F., Hyde Park, Boston, Mass.
- Universal Blower Co., Birmingham, Mich.
- Victor Electric Products, Inc., Cincinnati, O.
- Viking Air Conditioning Corp., Cleveland, O.
- Wood Industries, Inc., Gar, Detroit, Mich.

### FANS, VENTILATING, PROPELLER TYPE

(Capacity 4,000 c.f.m. up)

- Advance Aluminum Coasting Corp., Chicago, Ill.
- Aerovent Fan Co., Piqua, O.
- Air Conditioning Products Co., Detroit, Mich.
- Air Controls, Inc., Cleveland, O.
- Aircraft Mfg. Co., Dayton, Ohio.
- Air Devices Corp., Meriden, Conn.
- Airecon Industries, Detroit, Mich.
- Aire-Foile Fan & Blower Co., Detroit, Mich.
- Airmaster Corp., Chicago, Ill.
- Allen Corp., Detroit, Mich.
- American Blower Corp., Detroit, Mich.
- American Coolair Corp., Jacksonville, Fla.
- Ames Co., W. R., San Francisco, Cal.
- Arex Co., Chicago, Ill.
- Autovent Fan & Blower Co., Chicago, Ill.
- Bayley Blower Co., Milwaukee, Wis.
- Belanger Fan & Blower Co., Detroit, Mich.
- Berns Specialty Co., Chicago, Ill.
- Bishop & Babcock Sales Co., Cleveland, O.
- Buffalo Forge Co., Buffalo, N. Y.
- Burt Mfg. Co., Akron, O.
- Champion Blower & Forge Co., Lancaster, Pa.
- Clarage Fan Co., Kalamazoo, Mich.
- Clay Equipment Corp., Cedar Falls, Ia.

- Columbus Heating & Ventilating Co., Columbus, O.
- Coppus Engineering Corp., Worcester, Mass.
- Davenport Mfg. Co., Meadville, Pa.
- De Bothesat Ventilating Equipment Division, American Machine & Metals, Inc., New York City.
- Diehl Mfg. Co., Elizabeth, N. J.
- Economy Electric Manufacturing Co., Cicero, Ill.
- Electrovent Fan & Mfg. Co., Chicago, Ill.
- Emerson Electric Mfg. Co., St. Louis, Mo.
- Evry-Use Products, Inc., New York City.
- Forest-Air Co., Rockford, Ill.
- Fresh'nd-Aire Co., Chicago, Ill.
- Garden City Fan Co., Chicago, Ill.
- Gas City Glass Co., Gas City, Ind.
- General Blower Co., Philadelphia, Pa.
- General Regulator Corp., Chicago, Ill.
- Grand Rapids Blow Pipe and Dust Arrester Co., Grand Rapids, Mich.
- Hartzell Propeller Fan Co., Piqua, O.
- Hirschman Co., Inc., W. F., Buffalo, N. Y.
- Holtum Mfg. Co., Freeport, Ill.
- Hudson Equipment Corp., Minneapolis, Minn.
- Ilg Electric Ventilating Co., Chicago, Ill.
- International Engineering, Inc., Dayton, O.
- Johnson Fan & Blower Corp., Chicago, Ill.
- Johnston & Co., Wm. W., Dayton, O.
- Jordan & Co., Paul R., Indianapolis, Ind.
- King Ventilating Co., Owatonna, Minn.
- Kisco Company, Inc., St. Louis, Mo.
- MaGill Foundry & Furnace Works, P. H. Bloomington, Ill.
- Marathon Electric Mfg. Corp., Wausau, Wis.
- Meier Electric & Machine Co., Indianapolis, Ind.
- Mountain States Equipment Co., Denver, Colo.
- Myers Electric Co., Pittsburgh, Pa.
- National Fan & Blower Corp., Subsidiary U. S. Air Conditioning Corp., Minneapolis, Minn.
- Nelson Corp., Herman, Moline, Ill.
- New York Blower Co., Chicago, Ill.
- Peerless Electric Co., Warren, O.
- Propellair, Inc., Springfield, O.
- Puhl & Hepper Mfg. Co., Inc., St. Louis, Mo.
- Reed Unit-Fans, Inc., New Orleans, La.
- Russell Insulation Co., F. C., Baltimore, Md.
- Schwitzer-Cummins Co., Indianapolis, Ind.
- Signal Electric Mfg. Co., Menominee, Mich.
- Star Electric Motor Co., Bloomfield, N. J.
- Sturtevant Co., B. F., Hyde Park, Boston, Mass.
- Thermal Units Mfg. Co., Meriden, Conn.
- Utility Fan & Mfg. Co., Los Angeles, Cal.
- Victor Electric Products, Inc., Cincinnati, O.
- Viking Air Conditioning Corp., Cleveland, O.
- Western Blower Co., Seattle, Wash.
- Western Rotary Ventilator Co., Inc., Los Angeles, Cal.
- Wing Mfg. Co., L. J., New York City.

### FAN (PROPELLER)—FILTER UNITS

- Air Controls, Inc., Cleveland, O.
- Air Conditioning Products Co., Detroit, Mich.
- Belanger Fan & Blower Co., Detroit, Mich.
- Champion Blower & Forge Co., Lancaster, Pa.
- Chicago Steel Furnace Co., Chicago, Ill.
- Forest-Air Co., Rockford, Ill.
- Henry Furnace & Foundry Co., Cleveland, O.
- International Engineering, Inc., Dayton, O.
- Osborn Co., J. M. & L. A., Cleveland, O.
- Peerless Electric Co., Warren, Ohio.
- Propellair, Inc., Springfield, O.
- Russell Electric Co., Chicago, Ill.
- Russell Insulation Co., The F. C., Baltimore, Md.

### FILTERS, AIR, AUTOMATIC

- American Air Filter Co., Inc., Louisville, Ky.
- Bubar, Hudson H., New York, N. Y.
- Burt Air Filter Corp., New York, N. Y.
- Coppus Engineering Corp., Worcester, Mass.
- Dracco Corp., Cleveland, O.
- Hugo Mfg. Co., West Duluth, Minn.
- Independent Air Filter Co., Chicago, Ill.
- Northern Blower Co., Cleveland, O.
- Staynew Filter Corp., Rochester, N. Y.
- Universal Air Filter Corp., Duluth, Minn.
- Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. (Electrostatic Precipitator)

### FILTERS, AIR, UNIT, DRY

- American Air Filter Co., Inc., Louisville, Ky.
- American Foundry & Furnace Co., Bloomington, Ill.
- Amirton Co., Inc., New York City.
- Annis, Emmett F., Glendale, Cal.
- Bubar, Hudson H., New York, N. Y.
- Burt Air Filter Corp., New York, N. Y.
- Consolidated Air Conditioning Corp., New York, N. Y. (Odor adsorbers)
- Coppus Engineering Corp., Worcester, Mass.
- Davies Air Filter Co., New York, N. Y.



Dracco Corp., Cleveland, O.  
 Felters Co., Inc., Boston, Mass.  
 Hugo Mfg. Co., West Duluth, Minn.  
 Independent Air Filter Co., Chicago, Ill.  
 Kauffman Air Conditioning Corp., St. Louis, Mo.  
 Kleenaire Corp., Stevens Point, Wis.  
 Somers, Inc., H. J., Detroit, Mich.  
 Staynew Filter Corp., Rochester, N. Y.  
 Tuttle Air Filter Co., Inc., Louisville, Ky.  
 Universal Air Filter Corp., Duluth, Minn.

### FILTERS, AIR, UNIT, VISCOUS

Air-Maze Corp., Cleveland, O.  
 ●American Air Filter Co., Inc., Louisville, Ky.  
 American Radiator Co., New York, N. Y.  
 Bache & Co., Semon, New York, N. Y.  
 Bubar, Hudson H., New York, N. Y.  
 Gehri Company, Tacoma, Wash.  
 Independent Air Filter Co., Chicago, Ill.  
 Kauffman Air Conditioning Corp., St. Louis, Mo.  
 Kleenaire Corp., Stevens Point, Wis.  
 ●Owens-Illinois' Glass Co., Toledo, O.  
 Plymouth Cordage Co., N. Plymouth, Mass.  
 Ripley Co., W. R., Tacoma, Wash.  
 Tuttle Air Filter Co., Inc., Louisville, Ky.  
 Wilson & Co., Chicago, Ill.

### FIRE BRICK

See Refractories

### FITTINGS AND ACCESSORIES, CONDUCTOR

(Elbows, Heads, Hooks, Shoes, Straps, etc.)

Barnes Metal Products Co., Chicago, Ill.  
 ●Berger Bros. Co., Philadelphia, Pa.  
 Berger Mfg. Co., Div. of Republic Steel Corp., Canton, O.  
 Braden Mfg. Co., Terre Haute, Ind.  
 Char-Gale Mfg. Co., Minneapolis, Minn.  
 Chase Brass & Copper Co., Inc., Waterbury, Conn.  
 Chicago Metal Mfg. Co., Chicago, Ill.  
 Cincinnati Sheet Metal & Roofing Co., Cincinnati, O.  
 Cray Mfg. Co., Middleport, O. (Cut-off)  
 Danzer Metal Works Co., Hagerstown, Md.  
 Dieckmann Co., Ferdinand, Cincinnati, O.  
 Downs-Smith Brass & Copper Co., New York City.  
 Edwards Mfg. Co., Inc., Cincinnati, O.  
 ●Hussey & Co., C. G., Pittsburgh, Pa.  
 Iwan Bros., South Bend, Ind.  
 Jelliff Mfg. Corp., C. O., Southport, Conn.  
 Klauer Mfg. Co., Dubuque, Ia.  
 La Crosse Steel Roofing & Corrugating Co., La Crosse, Wis.  
 Lamb & Ritchie Co., Cambridge, Mass.  
 ●Levow, David, New York City.  
 ●Lyon, Conklin & Co., Inc., Baltimore, Md.  
 Martin Metal Mfg. Co., Wichita, Kan.  
 Maysteel Products, Inc., Mayville, Wis.  
 ●Milcor Steel Co., Milwaukee, Wis.  
 Miller & Doing, Inc., Brooklyn, N. Y.  
 New Delphos Mfg. Co., Delphos, O.  
 Norman Sheet Metal Mfg. Co., W. F., Nevada, Mo.  
 ●Osborn Co., J. M. & L. A., Cleveland, O.  
 Perrin Co., Edward C., Camden, N. J.  
 Providence Cornice Co., Providence, R. I.  
 Royal Metal Products Co., Brooklyn, N. Y.  
 St. Paul Corrugating Co., St. Paul, Minn.  
 Schoedinger Co., F. O., Columbus, O.  
 Sheet Metal Products Co., Peoria, Ill.  
 Stewart Foundry, O. S., Cleveland, O.  
 Tiffin Art Metal Co., Tiffin, O.  
 Watson Co., Inc., Jas. H., Bradley, Ill.  
 Wheeling Corrugating Co., Wheeling, W. Va.  
 Wheeling Metal & Mfg. Co., Wheeling, W. Va.  
 Willis Mfg. Co., Galesburg, Ill.  
 Woolwine Metal Products Co., Los Angeles, Cal.

### FITTINGS AND ACCESSORIES, EAVES TROUGH AND GUTTER

(Hangers, Strainers, Miters, Ends, Thimbles, etc.)

Abbott Mfg. Co., Painesville, O. (Hangers)  
 Barnes Metal Products Co., Chicago, Ill.  
 ●Berger Bros. Co., Philadelphia, Pa.  
 Berger Mfg. Co., Div. of Republic Steel Corp., Canton, O.  
 Bertram Mfg. Co., Chicago, Ill.  
 Braden Mfg. Co., Terre Haute, Ind.  
 California Cornice, Steel and Supply Corp., Los Angeles, Cal.  
 Chicago Metal Mfg. Co., Chicago, Ill.  
 Chase Brass & Copper Co., Inc., Waterbury, Conn.  
 Cincinnati Sheet Metal & Roofing Co., Cincinnati, O.  
 Danzer Metal Works Co., Hagerstown, Md.  
 Downs-Smith Brass & Copper Co., New York City.  
 Edwards Mfg. Co., Inc., Cincinnati, O.  
 Grand Rapids Wire Products Co., Grand Rapids, Mich.  
 ●Hussey & Co., C. G., Pittsburgh, Pa. (Copper)  
 Iwan Brothers, South Bend, Ind.  
 Klauer Mfg. Co., Dubuque, Ia.

La Crosse Steel Roofing & Corrugating Co., La Crosse, Wis.  
 Lamb & Ritchie Co., Cambridge, Mass.  
 Ledkote Products Co., Long Island City, N. Y.  
 ●Levow, David, New York City.  
 Lyman Co., H. B., Southampton, Mass.  
 ●Lyon, Conklin & Co., Inc., Baltimore, Md.  
 Martin Metal Mfg. Co., Wichita, Kan.  
 ●Milcor Steel Co., Milwaukee, Wis.  
 New Delphos Mfg. Co., Delphos, O.  
 Ohio Wire Products Co., Dover, O. (Hangers)  
 ●Osborn Co., J. M. & L. A., Cleveland, O.  
 Providence Cornice Co., Providence, R. I.  
 Reeves Steel & Mfg. Co., Dover, O.  
 Royal-Apex Mfg. Corp., Brooklyn, N. Y.  
 St. Paul Corrugating Co., St. Paul, Minn.  
 Sheet Metal Products Co., Peoria, Ill.  
 Snap-On Mfg. Co., Chicago, Ill. (Hangers)  
 Southbridge Roofing Co., Inc., Southbridge, Mass.  
 Tiffin Art Metal Co., Tiffin, O.  
 U. S. Cistern Filter Mfg. Co., Bloomington, Ill.  
 Waddell, Bruce, Indianapolis, Ind.  
 Watson Co., Inc., Jas. H., Bradley, Ill.  
 Wheeling Corrugating Co., Wheeling, W. Va.  
 Wheeling Metal & Mfg. Co., Wheeling, W. Va.  
 Willis Mfg. Co., Galesburg, Ill.  
 Woolwine Metal Products Co., Los Angeles, Cal.

### FITTINGS AND ACCESSORIES, FURNACE PIPE

(Angles, Boots, Elbows, Heads, Joints, Offsets, Tees, etc.)

Acer & Whedon, Inc., Medina, N. Y.  
 Acme Tin Plate & Roofing Supply Co., Philadelphia, Pa.  
 Atlas Heating & Ventilating Co., Ltd., San Francisco, Cal.  
 Bergstrom Mfg. Corp., Neenah, Wis.  
 Braden Mfg. Co., Terre Haute, Ind.  
 Budke Stampings Co., Canonsburg, Pa.  
 Campbell Heating Co., Des Moines, Ia.  
 Cary Mfg. Co., Waupaca, Wis.  
 Champion Furnace Pipe Co., Peoria, Ill.  
 Chicago Metal Mfg. Co., Chicago, Ill.  
 Cincinnati Sheet Metal & Roofing Co., Cincinnati, O.  
 Cincinnati Stamping Co., Cincinnati, O.  
 Corbman Bros., Inc., Philadelphia, Pa.  
 Excelsior Steel Furnace Co., Chicago, Ill.  
 Farquhar Furnace Co., Wilmington, O.  
 ●Henry Furnace & Foundry Co., Cleveland, O.  
 Holland Furnace Co., Holland, Mich.  
 Home Furnace Co., Holland, Mich.  
 Howe & Bassett Co., Inc., Rochester, N. Y. (Boots)  
 Howes Co., S. M., Charlestown, Boston, Mass.  
 International Heater Co., Utica, N. Y.  
 Kalamazoo Stove Co., Kalamazoo, Mich.  
 La Crosse Steel Roofing & Corrugating Co., La Crosse, Wis.  
 (Elbows and pipe only)  
 ●Lamneck Products, Inc., Columbus, O.  
 Lyman Co., H. B., Southampton, Mass.  
 ●Lyon, Conklin & Co., Inc., Baltimore, Md.  
 Majestic Co., Huntington, Ind.  
 Marshall Furnace Co., Marshall, Mich.  
 Martin Bros., Rochester, N. Y.  
 Martin Metal Mfg. Co., Wichita, Kan.  
 ●Meyer & Bro. Co., F., Peoria, Ill.  
 ●Milcor Steel Co., Milwaukee, Wis.  
 Monarch Furnace Fittings Manufacturers, Chicago, Ill.  
 ●Mueller Furnace Co., L. J., Milwaukee, Wis.  
 Norman Sheet Metal Mfg. Co., Nevada, Mo.  
 ●Osborn Co., J. M. & L. A., Cleveland, O.  
 ●Pacific Gas Radiator Co., Los Angeles, Cal.  
 Parkersburg Iron & Steel Co., Parkersburg, W. Va.  
 ●Payne Furnace & Supply Co., Beverly Hills, Cal.  
 ●Peerless Foundry Co., Indianapolis, Ind.  
 Providence Cornice Co., Providence, R. I.  
 Reeves Steel & Mfg. Co., Dover, O.  
 Roberts-Hamilton Co., Minneapolis, Minn.  
 ●Rock Island Register Co., Rock Island, Ill.  
 Schechter Brothers Co., Philadelphia, Pa.  
 Sterling Foundry Co., Sterling, Ill. (Cast Iron)  
 Stratton & Terstegge Co., Louisville, Ky.  
 Tiffin Art Metal Co., Tiffin, O.  
 ●Tuttle & Bailey, Inc., New Britain, Conn. (Turning blades)  
 ●United States Register Co., Battle Creek, Mich.  
 Wheeling Corrugating Co., Wheeling, W. Va.  
 Williamson Heater Co., Cincinnati, O.

### FITTINGS AND ACCESSORIES, SMOKE PIPE

(Draw-bands, Clean-outs, Collars, Tees, etc.)

Acer & Whedon, Inc., Medina, N. Y.  
 Acme Tin Plate & Roofing Supply Co., Philadelphia, Pa.  
 Atlas Heating & Ventilating Co., Ltd., San Francisco, Cal.  
 Bardes Range & Foundry Co., E. H., Cincinnati, O.  
 Bergstrom Mfg. Corp., Neenah, Wis.  
 Braden Mfg. Co., Terre Haute, Ind.  
 ●Brauer Supply Co., A. G., St. Louis, Mo.  
 Cary Mfg. Co., Waupaca, Wis.  
 Champion Furnace Pipe Co., Peoria, Ill.  
 Chicago Metal Mfg. Co., Chicago, Ill.  
 Cincinnati Sheet Metal & Roofing Co., Cincinnati, O.  
 Cincinnati Stamping Co., Cincinnati, O.  
 Danzer Metal Works Co., Hagerstown, Md.



- Detroit Safety Furnace Pipe Co., Detroit, Mich.
- Excelsior Steel Furnace Co., Chicago, Ill.
- Harold Furnace Mfg. Co., Spokane, Wash.
- Hart & Cooley Mfg. Co., Chicago, Ill. (Lugs)
- Henry Furnace & Foundry Co., Cleveland, O.
- Home Furnace Co., Holland, Mich.
- Howes Co., S. M., Charlestown, Boston, Mass.
- International Heater Co., Utica, N. Y.
- La Crosse Steel Roofing & Corrugating Co., La Crosse, Wis.
- Lamneck Products, Inc., Columbus, O.
- Lyman Co., H. B., Southampton, Mass.
- Lyon, Conklin & Co., Inc., Baltimore, Md.
- Majestic Co., Huntington, Ind.
- Maple City Furnace Co., Monmouth, Ill.
- Marshall Furnace Co., Marshall, Mich.
- Martin Metal Mfg. Co., Wichita, Kan.
- Meyer & Bro. Co., F., Peoria, Ill.
- Milcor Steel Co., Milwaukee, Wis.
- Mueller Furnace Co., L. J., Milwaukee, Wis.
- Norman Sheet Metal Mfg. Co., W. F., Nevada, Mo.
- Osborn Co., J. M. & L. A., Cleveland, O.
- Patten Co., J. V., Sycamore, Ill.
- Peerless Foundry Co., Indianapolis, Ind.
- Providence Cornice Co., Providence, R. I.
- Reeves Steel & Mfg. Co., Dover, O.
- Roberts-Hamilton Co., Minneapolis, Minn.
- Rock Island Register Co., Rock Island, Ill.
- Schechter Brothers Co., Philadelphia, Pa.
- Schoedinger, F. O., Columbus, O.
- Standard Furnace & Supply Co., Omaha, Nebr.
- Stratton & Terstegge Co., Louisville, Ky.
- Tierney Rotor Ventilator Co., Minneapolis, Minn.
- Tiffin Art Metal Co., Tiffin, O.
- United States Register Co., Battle Creek, Mich.
- Watson Co., Inc., Jas. H., Bradley, Ill.
- Wilder Manufacturing Co., Niles, O.
- Williamson Heater Co., Cincinnati, O.
- Wise Furnace Co., Akron, O.

### FITTINGS AND ACCESSORIES, STOVE PIPE

(Draw-bands, Collars, Tees, etc.)

- Acer & Whedon, Inc., Medina, N. Y.
- Acme Tin Plate & Roofing Supply Co., Philadelphia, Pa.
- Bardes Range & Foundry Co., E. H., Cincinnati, O.
- Chicago Metal Mfg. Co., Chicago, Ill.
- Excelsior Steel Furnace Co., Chicago, Ill.
- Howes Co., S. M., Charlestown, Boston, Mass.
- Milcor Steel Co., Milwaukee, Wis.
- Osborn Co., J. M. & L. A., Cleveland, O.
- Parkersburg Iron & Steel Co., Parkersburg, W. Va.
- Peerless Foundry Co., Indianapolis, Ind.
- Providence Cornice Co., Providence, R. I.
- Reeves Steel & Mfg. Co., Dover, O.
- Roberts-Hamilton Co., Minneapolis, Minn.
- Schechter Brothers Co., Philadelphia, Pa.
- Schoedinger, F. O., Columbus, O.
- Stratton & Terstegge Co., Louisville, Ky.
- United States Register Co., Battle Creek, Mich.
- Walker Mfg. & Sales Corp., St. Joseph, Mo. (Tees).
- Wheeling Corrugating Co., Wheeling, W. Va.
- Wilder Manufacturing Co., Niles, O.

### FITTINGS, BLOW PIPE

(Elbows, Flanges, Hangers, Hoods and Sweeps, Joints, Rings, Tubing)

- Acer & Whedon, Inc., Medina, N. Y.
- Airtherm Mfg. Co., St. Louis, Mo.
- Blower Application Co., Milwaukee, Wis.
- Chicago Metal Mfg. Co., Chicago, Ill.
- Danzer Metal Works Co., Hagerstown, Md.
- Day Co., Minneapolis, Minn.
- Falstrom Co., Passaic, N. J.
- Goethel Sheet Metal Works, Alfred, Milwaukee, Wis.
- Goethel Co., Alfred C., Milwaukee, Wis.
- Grand Rapids Blow Pipe & Dust Arrester Co., Grand Rapids, Mich.
- Industrial Sheet Metal Works, Inc., Detroit, Mich.
- Kirk & Blum Mfg. Co., Cincinnati, O.
- Lee & Son Co., Thomas, Cincinnati, O.
- Mahon Co., R. C., Detroit, Mich.
- Meyer & Bro. Co., F., Peoria, Ill.
- Providence Cornice Co., Providence, R. I.
- Western Blower Co., Seattle, Wash.
- Young & Bertke Co., Cincinnati, O.

### FITTINGS, HUMIDIFIER, WATER LINE

- Air Conditioning Supply Co., Cleveland, O.
- American Brass Co., Waterbury, Conn.
- Bishop Humidifier Co., Detroit, Mich.
- Chase Brass & Copper Co., Inc., Waterbury, Conn.
- Fisher Governor Co., Marshalltown, Ia.
- Hays Mfg. Co., Erie, Pa.
- Holland Furnace Co., Holland, Mich.
- Kleenaire Corp., Stevens Point, Wis.
- Maid-O'-Mist, Inc., Chicago, Ill.

- Monmouth Products Co., Cleveland, O.
- Reichert Float & Mfg. Co., Toledo, O.
- Sallada Mfg. Co., Minneapolis, Minn.
- Scovill Mfg. Co., Morency-Van Bureau Div., Sturgis, Mich.
- Skuttle Co., J. L., Detroit, Mich.
- Streamline Pipe & Fittings Div., Mueller Brass Co., Port Huron, Mich.
- Turney Corp., Muskegon, Mich.
- Weatherhead Co., Cleveland, O.

### FLANGES, BLOW PIPE

See Fittings, Blow Pipe

### FLASHINGS, ROOF, PATENTED

- Barrett Co., New York City.
- Bridesburg Foundry Co., Philadelphia, Pa.
- Chase Brass & Copper Co., Inc., Waterbury, Conn.
- Chicago Metal Mfg. Co., Chicago, Ill.
- Downs-Smith Brass & Copper Co., New York City.
- Eagle-Picher Lead Co., Cincinnati, O.
- Edwards Mfg. Co., Inc., Cincinnati, O.
- Figge Co., Chicago, Ill.
- Hussey & Co., C. G., Pittsburgh, Pa.
- Lamb & Ritchie Co., Cambridge, Mass.
- Ledkote Products Co., Long Island City, N. Y.
- Milcor Steel Co., Milwaukee, Wis.
- New Delphos Mfg. Co., Delphos, O.
- Norman Sheet Metal Mfg. Co., W. F., Nevada, Mo.
- Providence Cornice Co., Providence, R. I.
- Revere Copper and Brass Incorporated, New York City. (Patented)
- Robertson Co., H. H., Pittsburgh, Pa.
- Rochester Lead Works, Inc., Rochester, N. Y.
- Schoedinger, F. O., Columbus, O.
- Seep-Lok Flashing Co., Inc., Yonkers, N. Y.
- Simplex Manufacturing Co., Fond du Lac, Wis.
- ThruBond Flashing Corp., New York City.
- Van Noorden Co., E., Boston, Mass.
- Willis Mfg. Co., Galesburg, Ill. (Copper).
- York Corrugating Co., York, Pa.

### FLASHINGS, THROUGH-WALL, PATENTED

- American Brass Co., Waterbury, Conn. (Copper).
- Chase Brass & Copper Co., Inc., Waterbury, Conn.
- Cheney Co., Philadelphia, Pa. (Copper).
- Fingles, Inc., W. A., Baltimore, Md.
- Robertson Co., H. H., Pittsburgh, Pa.
- ThruBond Flashing Corp., New York City.
- Willis Mfg. Co., Galesburg, Ill. (Galvanized & copper).

### FLASHINGS, WALL, PATENTED

- Berger Mfg. Co., Div. of Republic Steel Corp., Canton, O.
- Cheney Co., Philadelphia, Pa.
- Fingles, Inc., W. A., Baltimore, Md.
- La Crosse Steel Roofing & Corrugating Co., La Crosse, Wis.
- Milcor Steel Co., Milwaukee, Wis.
- New Delphos Mfg. Co., Delphos, O.
- Norman Sheet Metal Mfg. Co., W. F., Nevada, Mo.
- Providence Cornice Co., Providence, R. I.
- St. Paul Corrugating Co., St. Paul, Minn.
- Schoedinger, F. O., Co., Columbus, O.
- Willis Mfg. Co., Galesburg, Ill.
- York Corrugating Co., York, Pa.

### FLUE GAS ANALYZERS

See Analysers, Flue Gas

### FLUX, SOLDERING

- Alumaweld Co. of America, Chicago, Ill.
- American Chemical Paint Co., Ambler, Pa.
- American Solder & Flux Co., Philadelphia, Pa.
- Belmont Smelting & Refining Works, Inc., Brooklyn, N. Y.
- Benson Co., Inc., Alex. R., Hudson, N. Y. (Salts, Pastes).
- Burnley Battery & Mfg. Co., North East, Pa. (Paste, Salts, Solution).
- Diener Mfg. Co., Geo. W., Chicago, Ill.
- Gardiner Metal Co., Chicago, Ill.
- General Electric Co., Schenectady, N. Y.
- Handy & Harmon, New York City.
- Imperial Brass Mfg. Co., Chicago, Ill.
- Kester Solder Co., Chicago, Ill.
- Ke-Ti Products Co., Columbus, O.
- Langsenkamp Co., F. H., Indianapolis, Ind. (Stainless Steel).
- Lukens Metal Co., Thos. F., Philadelphia, Pa.
- Milburn Co., Alexander, Baltimore, Md.
- Pfanstiehl Chemical Co., Waukegan, Ill.
- Potomac Mfg. Co., Philadelphia, Pa.
- Revere Copper and Brass Incorporated, New York City.
- Ruby Chemical Co., Columbus, O. (Liquid and Paste).
- Sight Feed Generator Co., Richmond, Ind.
- Torchweld Equipment Co., Chicago, Ill.

**FORCED DRAFT BLOWERS***See Blowers, Forced Draft***FURNACE BLOWERS***See Blowers, Furnace, Centrifugal***FURNACE-BURNER UNITS***See Furnaces, Air Conditioning, and Furnaces, Warm Air, Gravity***FURNACE CEMENT***See Cement, Furnace***FURNACE CHAIN***See Chain, Furnace***FURNACE COVERING***See Insulation, Furnace and Pipe***FURNACE FANS***See Fans, Furnace, Propeller Type***FURNACE FILTERS***See Filters, Air***FURNACE HUMIDIFIERS***See Humidifiers, Furnace, Evaporation and Spray***FURNACE INSULATION***See Insulation, Furnace and Pipe***FURNACE LINING***See Refractories***FURNACE PIPE***See Pipe, Furnace***FURNACE PIPE FITTINGS AND ACCESSORIES***See Fittings and Accessories, Furnace Pipe***FURNACE PULLEYS***See Pulleys, Furnace***FURNACE REGULATORS***See Regulators, Furnace Draft, Mechanical and Motors, Damper, Furnace Draft, Electrical***FURNACE REPAIRS***See Repairs, Stove and Furnace***FURNACE VACUUM CLEANERS***See Cleaners, Vacuum, Furnace***FURNACES, AIR CONDITIONING, COAL BURNING***(Matched furnace-fan-filter-humidifier unit)*

- Agricola Furnace Co., Inc., Gadsden, Ala.
- American Foundry & Furnace Co., Bloomington, Ill.
- American Furnace Co., St. Louis, Mo.
- American Furnace & Foundry Co., Milan, Mich.
- Arcweld Mfg. Co., Inc., Seattle, Wash.
- Armstrong Furnace Co., Columbus, O.
- Atlas Heating & Ventilating Co., Ltd., San Francisco, Cal.
- Auburn Automobile Co., Air Cond. Div., Chicago, Ill., and Connorsville, Ind.
- Baker Furnace & Cleaner Mfg. Co., Toledo, O.
- Bryant Heater Co., Cleveland, O.
- Campbell Heating Co., Des Moines, Ia.
- Campbell Heating Co., E. K., Kansas City, Mo.
- Chandler Co., Cedar Rapids, Ia.
- Columbus Heating & Ventilating Co., Columbus, O.
- Dail Steel Products Co., Lansing, Mich.
- Dowagiac Steel Furnace Co., Dowagiac, Mich.
- Edwards Furnace Co., Wellsboro, Pa.
- Enterprise Boiler & Tank Works, Inc., Chicago, Ill.
- Excelsior Steel Furnace Co., Chicago, Ill.
- Forest City Foundries Co., Cleveland, O.
- Fox Furnace Co., Elyria, O.
- Green Foundry & Furnace Works, Des Moines, Ia.
- Hall-Neal Furnace Co., Indianapolis, Ind.
- Henry Furnace & Foundry Co., Cleveland, O.
- Hess Warming & Ventilating Co., Chicago, Ill.
- Holland Furnace Co., Holland, Mich.
- "Home Comfort" Furnace & Mfg. Co., St. Louis, Mo.
- International Heater Co., Utica, N. Y.
- Jackson & Church Co., Saginaw, Mich.

- Joliet Heating Corp., Joliet, Ill.
- Keith Furnace Co., Des Moines, Ia.
- Kelsey Heating Co., Syracuse, N. Y.
- Koons Furnace Co., Danville, Ill.
- LaCrosse Tractor Co., LaCrosse, Wis.
- Lennox Furnace Co., Marshalltown, Ia.
- Liberty Foundry Co., St. Louis, Mo.
- MaGill Foundry & Furnace Works, P. H., Bloomington, Ill.
- Majestic Co., Huntington, Ind.
- Marshall Furnace Co., Marshall, Mich.
- May-Fiebeger Co., Newark, O.
- Meyer Furnace Co., Peoria, Ill.
- Michigan Tank & Furnace Corp., Detroit, Mich.
- Montag Stove & Furnace Works, Portland, Ore.
- Mueller Furnace Co., L. J., Milwaukee, Wis.
- McPherson Furnace & Supply Co., Portland, Ore.
- National Mfg. & Engineering Co., Detroit, Mich.
- Naylor Pipe Co., Chicago, Ill. (Magazine Feed)
- Nelson Corp., Herman, Moline, Ill.
- Peerless Foundry Co., Indianapolis, Ind.
- Pennsylvania Engineering Works, New Castle, Pa.
- Pennsylvania Furnace & Iron Co., Warren, Pa.
- Pittsburgh Furnace Parts Co., Pittsburgh, Pa.
- Premier Furnace Co., Dowagiac, Mich.
- Richardson & Boynton Co., New York City.
- Robinson Furnace Co., Chicago, Ill.
- Robinson Heating & Ventilating Corp., Massillon, O.
- Rock Island Stove Co., Rock Island, Ill.
- Round Oak Co., Dowagiac, Mich.
- Rudy Furnace Co., Dowagiac, Mich.
- Rybolt Heater Co., Ashland, O.
- Security Stove & Mfg. Co., Kansas City, Mo.
- Spencer Heater Division Williamsport, Pa.
- Stiglitz Furnace & Foundry Co., Louisville, Ky.
- Supreme Heater & Ventilating Corp., St. Louis, Mo.
- Thatcher Furnace Co., Newark, N. J.
- Twentieth Century Heating & Ventilating Co., Akron, O.
- Waterman-Waterbury Co., Minneapolis, Minn.
- Williamson Heater Co., Cincinnati, O.
- Wise Furnace Co., Akron, O.
- XXth Century Heating & Ventilating Co., Akron, O.

**FURNACES, AIR CONDITIONING, GAS BURNING***(Matched furnace-fan-filter-humidifier unit)*

- Airtemp, Inc., Dayton, O.
- Aladdin Heating Corp., Oakland, Cal.
- American Foundry & Furnace Co., Bloomington, Ill.
- American Furnace Co., St. Louis, Mo.
- American Gas Products Corp., New York City.
- Associated Air Conditioning Corp., St. Louis, Mo.
- Bryant Corp., C. L., Cleveland, O.
- Bryant Heater Co., Cleveland, O.
- Campbell Heating Co., Des Moines, Ia.
- Carrier Corp., Syracuse, N. Y.
- Corosone Air Conditioning Corporation, Cleveland, O.
- Dail Steel Products Co., Lansing, Mich.
- Des Moines Steel Furnace Co., Des Moines, Ia.
- Dunham Company, C. A., Chicago, Ill.
- Edwards Mfg. Co., Inc., Cincinnati, O.
- Electrogas Furnace & Mfg. Co., San Francisco, Cal.
- Evans Corp., Geo., Moline, Ill.
- Fitzgibbons Boiler Co., Inc., New York City.
- Forest City Foundries Co., Cleveland, O.
- Fox Furnace Co., Elyria, O.
- General Electric Co., Schenectady, N. Y.
- Green Foundry & Furnace Works, Des Moines, Ia.
- Hall-Neal Furnace Co., Indianapolis, Ind.
- Henry Furnace & Foundry Co., Cleveland, O.
- "Home Comfort" Furnace & Mfg. Co., St. Louis, Mo.
- Jackson & Church Co., Saginaw, Mich.
- Joliet Heating Corp., Joliet, Ill.
- Koons Furnace Co., Danville, Ill.
- LaCrosse Tractor Co., LaCrosse, Wis.
- Lennox Furnace Co., Marshalltown, Ia., and Syracuse, N. Y.
- Marvelaire Corporation, West Los Angeles, Cal.
- Mayflower-Lewis Corp., St. Paul, Minn.
- Meyer Furnace Co., Peoria, Ill.
- Michigan Tank & Furnace Corp., Detroit, Mich.
- Montag Stove & Furnace Works, Portland, Ore.
- Mueller Furnace Co., L. J., Milwaukee, Wis.
- National Mfg. & Engineering Co., Detroit, Mich.
- Nelson Corp., Herman, Moline, Ill.
- Norge Heating & Conditioning Div., Borg-Warner Corp., Detroit, Mich.
- Pacific Gas Radiator Co., Los Angeles, Cal.
- Payne Furnace & Supply Co., Beverly Hills, Cal.
- Premier Furnace Co., Dowagiac, Mich.
- Reynolds Corp., New York City.
- Resnor Mfg. Co., Mercer, Pa.
- Robinson Heating & Ventilating Corp., Massillon, O.
- Rock Island Stove Co., Rock Island, Ill.
- Royal Air Conditioning Equipment, Compton, Cal.
- Rudy Furnace Co., Dowagiac, Mich.
- Scott-Newcomb, Inc., St. Louis, Mo.
- Security Stove & Mfg. Co., Kansas City, Mo.
- Standard Furnace & Supply Co., Omaha, Nebr.
- Stiglitz Furnace & Foundry Co., Louisville, Ky.



- Surface Combustion Corp., Toledo, O.
- Texo Sales & Mfg. Co., Cincinnati, O.
- Twentieth Century Heating & Ventilating Co., Akron, O.
- Waterman-Waterbury Co., Minneapolis, Minn.
- Westinghouse Electric & Manufacturing Co., Mansfield, O.
- Williamson Heater Co., Cincinnati, O.
- XXth Century Heating & Ventilating Co., Akron, O.

## FURNACES, AIR CONDITIONING, OIL BURNING, WITH BURNER

(Matched furnace-fan-filter-humidifier unit)

- Airtemp, Inc., Dayton, O.
- American Air Conditioning Corp., Sebastopol, Cal.
- American Furnace & Foundry Co., Milan, Mich.
- American Furnace Co., St. Louis, Mo.
- Anchor Post Fence Co., Baltimore, Md.
- Arcweld Mfg. Co., Inc., Seattle, Wash.
- Autocrat Oil Burner Corp., Cedar Rapids, Ia.
- Campbell Heating Co., Des Moines, Ia.
- Carrier Corp., Syracuse, N. Y.
- Century Engineering Corp., Cedar Rapids, Ia.
- Chicago Steel Furnace Co., Chicago, Ill.
- Corozone Air Conditioning Corp., Cleveland, O.
- Dall Steel Products Co., Lansing, Mich.
- Delco-Frigidaire Conditioning Div., General Motors Sales Corp., Dayton, O.
- Des Moines Steel Furnace Co., Des Moines, Ia.
- Edwards Mfg. Co., Inc., Cincinnati, O.
- Electrol, Inc., Clifton, N. J.
- Fox Furnace Co., Elyria, O.
- Fargo Foundry Co., Fargo, N. D.
- Gasoroli Furnace Co., Chicago, Ill.
- General Electric Co., Schenectady, N. Y.
- Gilbert & Barker Mfg. Co., Springfield, Mass.
- Green Foundry & Furnace Works, Des Moines, Ia.
- Hall-Neal Furnace Co., Indianapolis, Ind.
- Harvey-Whipple, Inc., Springfield, Mass.
- Hell Co., Milwaukee, Wis.
- Henry Furnace & Foundry Co., Cleveland, O.
- Hess Warming and Ventilating Co., Chicago, Ill.
- Hotentot Co., Inc., Omaha, Nebr.
- International Heater Co., Utica, N. Y.
- Jackson & Church Co., Saginaw, Mich.
- Johnson Co., S. T., Oakland, Cal.
- Kals Sunrise Works, Detroit, Mich.
- Keith Furnace Co., Des Moines, Ia.
- Koons Furnace Co., Danville, Ill.
- Leeson Co., T. F., Detroit, Mich.
- Little Burner Co., Inc., H. C., San Rafael, Cal.
- Lochinvar Corp., Dearborn, Mich.
- Majestic Co., Huntington, Ind.
- Marshall Heating Co., Minneapolis, Minn.
- May Oil Burner Corp., Baltimore, Md.
- Meyer Furnace Co., Peoria, Ill.
- Montag Stove & Furnace Works, Portland, Ore.
- Mueller Furnace Co., L. J., Milwaukee, Wis.
- National Mfg. & Engineering Co., Detroit, Mich.
- Nelson Co., Detroit, Mich.
- Nelson Corp., Herman, Moline, Ill.
- Nomis Corp., Lafayette, Ind.
- Norge Heating & Conditioning Div., Borg-Warner Corp., Detroit, Mich.
- Nu-Way Corp., Rock Island, Ill.
- Oil Burner Builders, Inc., Bellevue, Ia.
- Perfect Burner Co., Lynn, Mass.
- Perfection Stove Co., Cleveland, O.
- Premier Furnace Co., Dowagiac, Mich.
- Ray Oil Burner Co., San Francisco, Cal.
- Reif-Rexell, Inc., Buffalo, N. Y.
- Reynolds Corp., New York City.
- Rock Island Stove Co., Rock Island, Ill.
- Scott-Newcomb, Inc., St. Louis, Mo.
- Stiglitz Furnace & Foundry Co., Louisville, Ky.
- Synco-Flame Burner Corp., Hartford, Conn.
- Tidewater Engineering Co., Gloucester, Mass.
- Timken Silent Automatic Div. The Timken-Detroit Axle Co., Detroit, Mich.
- Trane Co., LaCrosse, Wis.
- Waterman-Waterbury Co., Minneapolis, Minn.
- Wayne Oil Burner Corp., Ft. Wayne, Ind.
- Westwick & Son, Inc., John, Galena, Ill.
- Westinghouse Electric & Mfg. Co., Mansfield, O.
- Wood Industries, Inc., Gar, Detroit, Mich.
- York Oil Burner Co., Inc., York, Pa.

## FURNACES, AIR CONDITIONING, OIL BURNING, WITHOUT BURNER

(Matched furnace-fan-filter-humidifier unit)

- American Foundry & Furnace Co., Bloomington, Ill.
- American Furnace Co., St. Louis, Mo.
- American Furnace & Foundry Co., Milan, Mich.
- Ames Co., W. R., San Francisco, Cal.
- Arcweld Mfg. Co., Inc., Seattle, Wash.
- Associated Air Conditioning Corp., St. Louis, Mo.
- Atlas Heating & Ventilating Co., San Francisco, Cal.

- Auburn Automobile Co., Air Cond. Div., Chicago, Ill., and Connorsville, Ind.
- Bard Mfg. Co., Bryan, O.
- Campbell Heating Co., Des Moines, Ia.
- Dall Steel Products Co., Lansing, Mich.
- Des Moines Steel Furnace Co., Des Moines, Ia.
- Economy Baler Co., Ann Arbor, Mich.
- Evans Corp., Geo., Moline, Ill.
- Falstrom Co., Passaic, N. J.
- Fargo Foundry Co., Fargo, N. D.
- Fitzgibbons Boiler Co., Inc., New York City.
- Forest City Foundries Co., Cleveland, O.
- Fox Furnace Co., Elyria, O.
- General Metal Products Co., St. Louis, Mo.
- Green Foundry & Furnace Works, Des Moines, Ia.
- Hall-Neal Furnace Co., Indianapolis, Ind.
- Henry Furnace & Foundry Co., Cleveland, O.
- Hess Warming & Ventilating Co., Chicago, Ill.
- "Home Comfort" Furnace & Mfg. Co., St. Louis, Mo.
- International Heater Company, Utica, N. Y.
- Jackson & Church Co., Saginaw, Mich.
- Joliet Heating Corp., Joliet, Ill.
- Keith Furnace Co., Des Moines, Ia.
- Koons Furnace Co., Danville, Ill.
- LaCrosse Tractor Co., LaCrosse, Wis.
- Lennox Furnace Co., Marshalltown, Ia. and Syracuse, N. Y.
- Liberty Foundry Co., St. Louis, Mo.
- Majestic Co., Huntington, Ind.
- Mayflower-Lewis Corp., St. Paul, Minn.
- Meyer Furnace Co., Peoria, Ill.
- Michigan Tank & Furnace Corp., Detroit, Mich.
- Montag Stove & Furnace Works, Portland, Ore.
- Mueller Furnace Co., L. J., Milwaukee, Wis.
- National Mfg. & Engineering Co., Detroit, Mich.
- Nelson Co., Detroit, Mich.
- Nomis Corp., Lafayette, Ind.
- Peerless Foundry Co., Indianapolis, Ind.
- Premier Furnace Co., Dowagiac, Mich.
- Richardson & Boynton Co., New York City.
- Rock Island Stove Co., Rock Island, Ill.
- Round Oak Co., Dowagiac, Mich.
- Rudy Furnace Co., Dowagiac, Mich.
- Rybolt Heater Co., Ashland, O.
- Supreme Heater & Ventilating Corp., St. Louis, Mo.
- Twentieth Century Heating & Ventilating Co., Akron, O.
- Waterman-Waterbury Co., Minneapolis, Minn.
- Westwick & Son, Inc., John, Galena, Ill.
- Williamson Heater Co., Cincinnati, O.
- XXth Century Heating & Ventilating Co., Akron, O.

## FURNACES, AIR CONDITIONING, FOR STOKER-FIRING

(Complete matched unit with stoker furnished)

- American Foundry & Furnace Co., Bloomington, Ill.
- Campbell Heating Co., E. K., Kansas City, Mo.
- Excelsior Steel Furnace Co., Chicago, Ill.
- Hall-Neal Furnace Co., Indianapolis, Ind.
- Henry Furnace & Foundry Co., Cleveland, O.
- Hess Warming and Ventilating Co., Chicago, Ill.
- Joliet Heating Corp., Joliet, Ill.
- Kelsey Heating Co., Inc., Syracuse, N. Y.
- Meyer Furnace Co., Peoria, Ill.
- Montag Stove & Furnace Works, Portland, Ore.
- Nelson Corp., Herman, Moline, Ill.

## FURNACES, AIR CONDITIONING, FOR STOKER-FIRING

(Complete matched unit with stoker NOT furnished)

- American Foundry & Furnace Co., Bloomington, Ill.
- American Furnace Co., St. Louis, Mo.
- American Furnace & Foundry Co., Milan, Mich.
- Auburn Automobile Co., Air Cond. Div., Chicago, Ill., and Connorsville, Ind.
- Campbell Heating Co., E. K., Kansas City, Mo.
- Campbell Heating Co., Des Moines, Ia.
- Excelsior Steel Furnace Co., Chicago, Ill.
- Fitzgibbons Boiler Co., Inc., New York City.
- Fox Furnace Co., Elyria, O.
- Hall-Neal Furnace Co., Indianapolis, Ind.
- Henry Furnace & Foundry Co., Cleveland, O.
- Hess Warming and Ventilating Co., Chicago, Ill.
- "Home Comfort" Furnace & Mfg. Co., St. Louis, Mo.
- International Heater Co., Utica, N. Y.
- Joliet Heating Corp., Joliet, Ill.
- Keith Furnace Co., Des Moines, Ia.
- Kelsey Heating Co., Inc., Syracuse, N. Y.
- Lennox Furnace Co., Marshalltown, Ia.
- Meyer Furnace Co., Peoria, Ill.
- Mueller Furnace Co., L. J., Milwaukee, Wis.
- Montag Stove & Furnace Works, Portland, Ore.
- Nelson Corp., Herman, Moline, Ill.
- Premier Furnace Co., Dowagiac, Mich.
- Richardson & Boynton Co., New York City.
- Round Oak Co., Dowagiac, Mich.
- Waterman-Waterbury Co., Minneapolis, Minn.
- Westwick & Son, Inc., John, Galena, Ill.
- Williamson Heater Co., Cincinnati, O.



## FURNACES, FLOOR

- Aladdin Heating Corp., Oakland, Cal.  
 American Furnace & Foundry Co., Milan, Mich.  
 Andes Range & Furnace Corp., Geneva, N. Y.  
 ●Armstrong Furnace Co., Columbus, O.  
 Atlas Heating & Ventilating Co., Ltd., San Francisco, Cal.  
 Beck Engineering Combustion Company, St. Louis, Mo.  
 Cocking, Geo. J., Santa Ana, Cal.  
 Coleman Lamp & Stove Co., Wichita, Kan.  
 Des Moines Steel Furnace Co., Des Moines, Ia. (Gas)  
 Dowagiac Steel Furnace Co., Dowagiac, Mich.  
 Electrogas Furnace & Mfg. Co., San Francisco, Cal. (Gas & Butane)  
 Enterprise Foundry Co., Belleville, Ill.  
 Estate Stove Co., Hamilton, O. (Gas)  
 Excelsior Steel Furnace Co., Chicago, Ill.  
 Foss Heating & Engineering Co., Pasadena, Cal.  
 ●Fox Furnace Co., Elyria, O. (Gas)  
 Fraser Furnace Co., Inc., Stockton, Cal.  
 Gem City Stove Co., Dayton, O.  
 ●Hall-Neal Furnace Co., Indianapolis, Ind.  
 Heckler Bros., Pittsburgh, Pa. (Gas)  
 ●Henry Furnace & Foundry Co., Cleveland, O.  
 Holland Furnace Co., Holland, Mich.  
 Johnston Gas Furnace Corp., Los Angeles, Cal.  
 Koons Furnace Co., Danville, Ill.  
 Little Burner Co., Inc., H. C., San Rafael, Cal. (Oil burning)  
 Marshall Furnace Co., Marshall, Mich.  
 Marvelaire Corp., West Los Angeles, Cal.  
 Miller Floor Furnace Co., Oakland, Cal.  
 Mt. Vernon Furnace & Mfg. Co., Mt. Vernon, Ill.  
 ●Pacific Gas Radiator Co., Los Angeles, Cal.  
 ●Payne Furnace & Supply Co., Beverly Hills, Cal.  
 Pennsylvania Furnace & Iron Co., Warren, Pa.  
 Rock Island Stove Co., Rock Island, Ill.  
 Rudy Furnace Co., Dowagiac, Mich.  
 Security Stove & Mfg. Co., Kansas City, Mo. (Gas)  
 Stewart Furnace Co., Pittsburgh, Pa. (With gas burner)  
 ●Surface Combustion Corp., Toledo, O.  
 Ward Heater Co., Ltd., Los Angeles, Cal.  
 ●Waterman-Waterbury Co., Minneapolis, Minn.  
 Welded Steel Products Co., Milwaukee, Wis.

## FURNACES, SOLDERING

- Bernz Co., Inc., Otto, Rochester, N. Y.  
 Burgess Soldering Furnace Co., Columbus, O. (Gasoline)  
 Clayton & Lambert Mfg. Co., Detroit, Mich.  
 Diener Mfg. Co., Geo. W., Chicago, Ill.  
 Electric Soldering Iron Co., Inc., New York City.  
 Graham & Co., Inc., John H., New York City.  
 Hones, Inc., Charles A., Baldwin, N. Y.  
 ●Johnson Gas Appliance Co., Cedar Rapids, Ia.  
 Liquefied Gas Appliance Co., Mars, Pa.  
 Roper Corp., Geo. D., Rockford, Ill.  
 Turner Brass Works, Sycamore, Ill.  
 Wall Mfg. Supply Co., P., Pittsburgh, Pa.

## FURNACES, WARM AIR, GRAVITY, COAL BURNING, CAST IRON

- Agricola Furnace Co., Inc., Gadsden, Ala.  
 ●American Foundry & Furnace Co., Bloomington, Ill.  
 American Furnace Co., St. Louis, Mo.  
 American Furnace & Foundry Co., Milan, Mich.  
 Andes Range & Furnace Corp., Geneva, N. Y.  
 Barry Furnace Co., Hamilton, O.  
 Bergstrom Mfg. Corp., Neenah, Wis.  
 ●Brillion Furnace Co., Brillion, Wis.  
 ●Chandler Co., Cedar Rapids, Ia.  
 Cleveland Co-Operative Stove Co., Cleveland, O.  
 ●Columbus Heating & Ventilating Co., Columbus, O.  
 Danville Stove & Mfg. Co., Danville, Pa.  
 Des Moines Stove Repair Co., Des Moines, Ia.  
 Detroit Michigan Stove Co., Detroit, Mich.  
 Dowagiac Steel Furnace Co., Dowagiac, Mich.  
 Edwards Furnace Co., Wellsboro, Pa.  
 Emrich Co., C., Columbus, O.  
 Enterprise Boiler & Tank Works, Inc., Chicago, Ill.  
 Enterprise Foundry Co., Belleville, Ill.  
 Excelsior Steel Furnace Co., Chicago, Ill.  
 Excelsior Stove & Mfg. Co., Quincy, Ill.  
 Farris Furnace Co., Springfield, Ill.  
 Faultless Heater Corp., Cleveland, O.  
 Favorite Mfg. Co., Piqua, O.  
 Floral City Co., Monroe, Mich.  
 Floyd-Wells Co., Royersford, Pa.  
 Foote Foundry Co., J. B., Fredericktown, O.  
 Forest City Foundries Co., Cleveland, O.  
 ●Fox Furnace Co., Elyria, O.  
 Fuller-Warren Co., Milwaukee, Wis.  
 Germer Stove Co., Erie, Pa.  
 Green Foundry & Furnace Works, Des Moines, Ia.  
 ●Hall-Neal Furnace Co., Indianapolis, Ind.  
 Halstead Iron Foundry, Halsted, Pa.  
 Harold Furnace Mfg. Co., Spokane, Wash.  
 Hart & Crouse Co., Inc., Utica, N. Y.  
 Hart Mfg. Co., Louisville, Ky.  
 Heckler Bros., Pittsburgh, Pa.

- Henry Furnace & Foundry Co., Cleveland, O.  
 ●Hess-Snyder Co., Massillon, O.  
 Holland Furnace Co., Holland, Mich.  
 "Home Comfort" Furnace & Mfg. Co., St. Louis, Mo.  
 Home Furnace Co., Holland, Mich.  
 Home Stove Co., Indianapolis, Ind.  
 Ideal Furnace Co., Detroit, Mich.  
 Independence Stove & Furnace Co., Independence, Mo.  
 International Heater Co., Utica, N. Y.  
 Iowa Foundry Co., Sioux City, Ia.  
 Kalamazoo Stove Co., Kalamazoo, Mich.  
 Kansas City Furnace Co., Kansas City, Mo.  
 Keith Furnace Co., Des Moines, Ia.  
 Kelsey Heating Co., Syracuse, N. Y.  
 Klein Stove Co., Philadelphia, Pa.  
 Liberty Foundry Co., St. Louis, Mo.  
 McPherson Furnace & Supply Co., Portland, Ore.  
 MaGirl Foundry & Furnace Works, P. H., Bloomington, Ill.  
 Majestic Co., Huntington, Ind.  
 Maple City Furnace Co., Monmouth, Ill.  
 Marshall Furnace Co., Marshall, Mich.  
 May-Fiebeger Co., Newark, O.  
 ●Meyer Furnace Co., Peoria, Ill.  
 Miller Range & Furnace Co., Wm., Cincinnati, O.  
 Montag Stove & Furnace Works, Portland, Ore.  
 Moore Corp., Joliet, Ill.  
 Mt. Vernon Furnace & Mfg. Co., Mt. Vernon, Ill.  
 ●Mueller Furnace Co., L. J., Milwaukee, Wis.  
 Oakland Foundry Co., Belleville, Ill.  
 Orbon Stove Co., Belleville, Ill.  
 ●Osborn Co., J. M. & L. A., Cleveland, O.  
 ●Peerless Foundry Co., Indianapolis, Ind.  
 Phillips Heating, Ventilating & Mfg. Co., Los Angeles, Cal.  
 Pittsburgh Furnace Parts Co., Pittsburgh, Pa.  
 Pittston Stove Co., Pittston, Pa.  
 ●Premier Furnace Co., Dowagiac, Mich.  
 Richardson & Boynton Co., New York City.  
 Robinson Furnace Co., Chicago, Ill.  
 Rock Island Stove Co., Rock Island, Ill.  
 ●Round Oak Co., Dowagiac, Mich.  
 Rudy Furnace Co., Dowagiac, Mich.  
 ●Rybolt Heater Co., Ashland, O.  
 St. Clair Foundry Corp., Centralia, Ill.  
 Schill Mfg. Co., Crestline, O.  
 ●Schwab Furnace & Mfg. Co., Milwaukee, Wis.  
 Security Stove & Mfg. Co., Kansas City, Mo.  
 Sioux City Foundry and Boiler Co., Sioux City, Ia.  
 Spear Stove & Heating Co., James, Philadelphia, Pa.  
 Spencer Heater Division, Williamsport, Pa. (Magazine feed)  
 ●Standard Foundry & Furnace Co., De Kalb, Ill.  
 Standard Furnace & Supply Co., Omaha, Nebr.  
 Stanton Heater Co., Martins Ferry, O.  
 Thatcher Furnace Co., Newark, N. J.  
 ●Twentieth Century Heating & Ventilating Co., Akron, O.  
 United States Radiator Corp., Detroit, Mich.  
 Walker & Pratt Mfg. Co., Boston, Mass.  
 Washington Stove Works, Everett, Wash.  
 Western Furnaces, Inc., Tacoma, Wash.  
 Westwick & Son, Inc., John, Galena, Ill.  
 Williamson Heater Co., Cincinnati, O.  
 ●Wise Furnace Co., Akron, O.  
 ●XXth Century Heating & Ventilating Co., Akron, O.

## FURNACES, WARM AIR, GRAVITY, COAL BURNING, STEEL

- American Foundry & Furnace Co., Bloomington, Ill.  
 American Furnace Co., St. Louis, Mo.  
 American Furnace & Foundry Co., Milan, Mich.  
 Arcweld Mfg. Co., Inc., Seattle, Wash.  
 ●Armstrong Furnace Co., Columbus, O.  
 Baker Furnace & Cleaner Mfg. Co., Toledo, O.  
 Campbell Heating Co., Des Moines, Ia.  
 Campbell Heating Co., E. K., Kansas City, Mo.  
 Cole Hot Blast Mfg. Co., Chicago, Ill.  
 ●Dall Steel Products Co., Lansing, Mich.  
 Daniels Mfg. Co., Inc., Sam, Hardwick, Vt.  
 Deshler Foundry & Mach. Wks., Deshler, O.  
 Des Moines Stove Repair Co., Des Moines, Ia.  
 Detroit Michigan Stove Co., Detroit, Mich.  
 Dowagiac Steel Furnace Co., Dowagiac, Mich.  
 Enterprise Boiler & Tank Works, Inc., Chicago, Ill.  
 Excelsior Steel Furnace Co., Chicago, Ill.  
 Farquhar Furnace Co., Wilmington, O.  
 Faultless Heater Corp., Cleveland, O.  
 Floral City Co., Monroe, Mich.  
 Forest City Foundries Co., Cleveland, O.  
 ●Fox Furnace Co., Elyria, O.  
 Gehri Co., Tacoma, Wash.  
 ●Hall-Neal Furnace Co., Indianapolis, Ind.  
 Hart Mfg. Co., Louisville, Ky.  
 ●Henry Furnace & Foundry Co., Cleveland, O.  
 ●Hess-Snyder Co., Massillon, O.  
 ●Hess Warming & Ventilating Co., Chicago, Ill.  
 "Home Comfort" Furnace & Mfg. Co., St. Louis, Mo.  
 Home Stove Co., Indianapolis, Ind.  
 Ideal Furnace Co., Detroit, Mich.  
 International Heater Co., Utica, N. Y.  
 Iowa Foundry Co., Sioux City, Ia.  
 ●Jackson & Church Co., Saginaw, Mich.  
 Joliet Heating Corp., Joliet, Ill.

- Keith Furnace Co., Des Moines, Ia.
- Koons Furnace Co., Danville, Ill.
- Kruse & Dewenter Co., Indianapolis, Ind.
- LaCrosse Tractor Co., LaCrosse, Wis.
- Lee Heating Systems, Youngstown, O.
- Lennox Furnace Co., Marshalltown, Ia.
- Liberty Foundry Co., St. Louis, Mo.
- Lookout Furnace Co., Chattanooga, Tenn.
- MaGirl Foundry & Furnace Works, P. H., Bloomington, Ill.
- Majestic Co., Huntington, Ind.
- Majestic Furnace Co., Seattle, Wash.
- Marshall Furnace Co., Marshall, Mich.
- May-Fiebeger Co., Newark, O.
- Meyer Furnace Co., Peoria, Ill.
- Montag Stove & Furnace Works, Portland, Ore.
- Mueller Furnace Co., L. J., Milwaukee, Wis.
- National Mfg. & Engineering Co., Detroit, Mich.
- Nugent Sons, Inc., Thos., New York City.
- Patten Co., J. V., Sycamore, Ill.
- Peerless Foundry Co., Indianapolis, Ind.
- Pennsylvania Engineering Works, New Castle, Pa.
- Pennsylvania Furnace & Iron Co., Warren, Pa.
- Perfect Burner Co., Lynn, Mass.
- Pittsburgh Furnace Parts Co., Pittsburgh, Pa.
- Premier Furnace Co., Dowagiac, Mich.
- Ramey Mfg. Co., Columbus, O.
- Ribside Furnace Co., Wausau, Wis.
- Richardson & Boynton Co., New York City.
- Roberts-Hamilton Co., Minneapolis, Minn.
- Robinson Heating & Ventilating Corp., Massillon, O.
- Rosebraugh Co., W. W., Salem, Ore.
- Round Oak Co., Dowagiac, Mich.
- Rybolt Heater Co., Ashland, O.
- Schill Mfg. Co., Crestline, O.
- Schwab Furnace & Mfg. Co., Milwaukee, Wis.
- Sioux City Foundry and Boiler Co., Sioux City, Ia.
- Smuck-Thiele Co., Indianapolis, Ind.
- Thatcher Furnace Company, Newark, N. J.
- Thompson Mfg. Co., Denver, Colo.
- Twentieth Century Heating & Ventilating Co., Akron, O.
- Waterman-Waterbury Co., Minneapolis, Minn.
- Welded Steel Products Co., Milwaukee, Wis.
- Williamson Heater Co., Cincinnati, O.
- Wise Furnace Co., Akron, O.
- Woodward & Co., Thos. S., Rochester, N. Y.
- XXth Century Heating & Ventilating Co., Akron, O.

### FURNACES, WARM AIR, GRAVITY, GAS BURNING, CAST IRON

- American Foundry & Furnace Co., Bloomington, Ill.
- American Furnace Co., St. Louis, Mo.
- Beck Engineering Combustion Company, St. Louis, Mo.
- Bryant Heater Co., Cleveland, O.
- Favorite Mfg. Co., Piqua, O.
- Forest City Foundries Co., Cleveland, O.
- Fox Furnace Co., Elyria, O.
- Green Foundry & Furnace Works, Des Moines, Ia.
- Hart Mfg. Co., Louisville, Ky.
- Henry Furnace & Foundry Co., Cleveland, O.
- "Home Comfort" Furnace & Mfg. Co., St. Louis, Mo.
- Jackson Sheet Metal Works, Ogden, Utah. (Combination Iron and Steel)
- Johnson Gas Furnace Corp., Los Angeles, Cal.
- Kelsey Heating Co., Syracuse, N. Y.
- Marvelaire Corp., West Los Angeles, Cal.
- Mt. Vernon Furnace & Mfg. Co., Mt. Vernon, Ill.
- Mueller Furnace Co., L. J., Milwaukee, Wis.
- Norge Heating & Conditioning Div., Borg-Warner Corp., Detroit, Mich.
- Pacific Gas Radiator Co., Los Angeles, Cal.
- Phillips Heating, Ventilating & Mfg. Co., Los Angeles, Cal.
- Reznor Mfg. Co., Mercer, Pa.
- Rudy Furnace Co., Dowagiac, Mich.
- Sioux City Foundry & Boiler Co., Sioux City, Ia.
- Standard Furnace & Supply Co., Omaha, Nebr.
- Ward Heater Co., Ltd., Los Angeles, Cal.
- Wise Furnace Co., Akron, O.

### FURNACES, WARM AIR, GRAVITY, GAS BURNING, STEEL

(Complete with burner)

- Aladdin Heating Corp., Oakland, Cal.
- American Furnace Co., St. Louis, Mo.
- Armstrong Furnace Co., Columbus, O.
- Atlas Heating & Ventilating Co., Ltd., San Francisco, Cal.
- Bryant Corp., C. L., Cleveland, O.
- Burmester Gas Furnace Mfg. Co., Omaha, Nebr. (Sheet Iron)
- Calkins & Pearce, Columbus, O.
- Cocking, Geo. J., Santa Ana, Cal.
- Dall Steel Products Co., Lansing, Mich.
- Des Moines Steel Furnace Co., Des Moines, Ia.
- Detroit Michigan Stove Co., Detroit, Mich.
- Edwards Mfg. Co., Inc., Cincinnati, O.
- Electrogas Furnace & Mfg. Co., San Francisco, Cal.
- Forest City Foundries Co., Cleveland, O.
- Foss Heating & Engineering Co., Pasadena, Cal.
- Fox Furnace Co., Elyria, O.

- Hall-Neal Furnace Co., Indianapolis, Ind.
- Heckler Bros., Pittsburgh, Pa.
- Hess-Snyder Co., Massillon, O.
- "Home Comfort" Furnace & Mfg. Co., St. Louis, Mo.
- Independence Stove & Furnace Co., Independence, Mo.
- Johnston Gas Furnace Corp., Los Angeles, Cal.
- LaCrosse Tractor Co., LaCrosse, Wis.
- Lee Heating Systems, Youngstown, O.
- Lennox Furnace Co., Marshalltown, Ia.
- Meyer Furnace Co., Peoria, Ill.
- Michigan Tank & Furnace Corp., Detroit, Mich.
- Mt. Vernon Furnace & Mfg. Co., Mt. Vernon, Ill.
- Mueller Furnace Co., L. J., Milwaukee, Wis.
- National Mfg. & Engineering Co., Detroit, Mich.
- Norge Heating & Conditioning Div. of Borg-Warner Corp., Detroit, Mich.
- Pacific Gas Radiator Co., Los Angeles, Cal.
- Payne Furnace & Supply Co., Beverly Hills, Cal.
- Pennsylvania Furnace & Iron Co., Warren, Pa.
- Phillips Heating, Ventilating & Mfg. Co., Los Angeles, Cal.
- Reznor Mfg. Co., Mercer, Pa.
- Robinson Heating & Ventilating Corp., Massillon, O.
- Ryniker Sheet Metal Works, Inc., Billings, Mont.
- Scott-Newcomb, Inc., St. Louis, Mo.
- Security Stove & Mfg. Co., Kansas City, Mo.
- Surface Combustion Corp., Toledo, O.
- Texo Sales & Mfg. Co., Cincinnati, O.
- Thompson Mfg. Co., Denver, Colo.
- Twentieth Century Heating & Ventilating Co., Akron, O.
- Ward Heater Co., Ltd., Los Angeles, Cal.
- Waterman-Waterbury Co., Minneapolis, Minn.
- XXth Century Heating & Ventilating Co., Akron, O.

### FURNACES, WARM AIR, GRAVITY, OIL BURNING, CAST IRON

(No burner furnished)

- Airtherm Mfg. Co., St. Louis, Mo.
- Andes Range & Furnace Corp., Geneva, N. Y.
- Chandler Co., Cedar Rapids, Ia.
- Detroit Michigan Stove Co., Detroit, Mich.
- Edwards Furnace Co., Wellsboro, Pa.
- Excelsior Steel Furnace Co., Chicago, Ill.
- Forest City Foundries Co., Cleveland, O.
- Green Foundry & Furnace Works, Des Moines, Ia.
- Hart & Crouse Co., Inc., Utica, N. Y.
- Henry Furnace & Foundry Co., Cleveland, O.
- Ideal Furnace Co., Detroit, Mich.
- International Heater Co., Utica, N. Y.
- Keith Furnace Co., Des Moines, Ia.
- Kelsey Heating Co., Syracuse, N. Y.
- MaGirl Foundry & Furnace Works, P. H., Bloomington, Ill.
- Marshall Furnace Co., Marshall, Mich.
- Mt. Vernon Furnace & Mfg. Co., Mt. Vernon, Ill.
- Reif-Rexoll, Inc., Buffalo, N. Y.
- Rudy Furnace Co., Dowagiac, Mich.
- Schwab Furnace & Mfg. Co., Milwaukee, Wis.
- Spear Stove & Heating Co., James, Philadelphia, Pa.
- Thatcher Furnace Company, Newark, N. J.

### FURNACES, WARM AIR, GRAVITY, OIL BURNING, STEEL

(No burner furnished)

- American Furnace Co., St. Louis, Mo.
- American Furnace & Foundry Co., Milan, Mich.
- Arcweld Mfg. Co., Inc., Seattle, Wash.
- Armstrong Furnace Co., Columbus, O.
- Baker Furnace & Cleaner Mfg. Co., Toledo, O.
- Bard Manufacturing Co., Bryan, O.
- Campbell Heating Co., E. K., Kansas City, Mo.
- Cary Mfg. Co., Waupaca, Wis.
- Dall Steel Products Co., Lansing, Mich.
- Des Moines Steel Furnace Co., Des Moines, Ia.
- Detroit Michigan Stove Co., Detroit, Mich.
- Dowagiac Steel Furnace Co., Dowagiac, Mich.
- Economy Baler Co., Ann Arbor, Mich.
- Enterprise Boiler & Tank Wks., Inc., Chicago, Ill.
- Evans Corp., George, Moline, Ill.
- Excelsior Steel Furnace Co., Chicago, Ill.
- Farquhar Furnace Co., Wilmington, O.
- Forest City Foundries Co., Cleveland, O.
- Fox Furnace Co., Elyria, O.
- Gasoroll Furnace Co., Chicago, Ill.
- Gehri Co., Tacoma, Wash.
- Hall-Neal Furnace Co., Indianapolis, Ind.
- Henry Furnace & Foundry Co., Cleveland, O.
- Hess-Snyder Co., Massillon, O.
- Hess-Warming & Ventilating Co., Chicago, Ill.
- "Home Comfort" Furnace & Mfg. Co., St. Louis, Mo.
- Ideal Furnace Co., Detroit, Mich.
- Jackson & Church Co., Saginaw, Mich.
- Joliet Heating Corp., Joliet, Ill.
- Keith Furnace Co., Des Moines, Ia.
- Kelsey Heating Co., Syracuse, N. Y.
- Koons Furnace Co., Danville, Ill.
- Kruse Co., Inc., Indianapolis, Ind.



- Kruse & Dewenter Co., Indianapolis, Ind.  
 LaCrosse Tractor Co., LaCrosse, Wis.  
 Lee Heating Systems, Youngstown, O.  
 Lennox Furnace Co., Marshalltown, Ia.  
 Liberty Foundry Co., St. Louis, Mo.  
 Lookout Furnace Co., Chattanooga, Tenn.  
 MaGirl Foundry & Furnace Works, P. H., Bloomington, Ill.  
 Marshall Furnace Co., Marshall, Mich.  
 Meyer Furnace Co., Peoria, Ill.  
 Michigan Tank & Furnace Corp., Detroit, Mich.  
 Montag Stove & Furnace Works, Portland, Ore.  
 Mueller Furnace Co., L. J., Milwaukee, Wis.  
 National Mfg. & Engineering Co., Detroit, Mich.  
 Oil Burner Builders, Inc., Bellevue, Ia.  
 Pacific Gas Radiator Co., Los Angeles, Cal.  
 Peerless Foundry Co., Indianapolis, Ind.  
 Premier Furnace Co., Dowagiac, Mich.  
 Rock Island Stove Co., Rock Island, Ill.  
 Rosebraugh Co., W. W., Salem, Ore.  
 Round Oak Co., Dowagiac, Mich.  
 Scott-Newcomb, Inc., St. Louis, Mo.  
 Schwab Furnace & Mfg. Co., Milwaukee, Wis.  
 Smuck-Thiele Co., Indianapolis, Ind.  
 Thatcher Furnace Co., Newark, N. J.  
 Thompson Mfg. Co., Denver, Col.  
 Twentieth Century Heating & Ventilating Co., Akron, O.  
 Waterman-Waterbury Co., Minneapolis, Minn.  
 Welded Steel Products Co., Milwaukee, Wis.  
 Wise Furnace Co., Akron, O.  
 XXth Century Heating & Ventilating Co., Akron, O.

### FURNACES, WARM AIR, GRAVITY, OIL BURNING, CAST IRON

(Complete with burner)

- Arcweld Mfg. Co., Inc., Seattle, Wash.  
 Forest City Foundries Co., Cleveland, O.  
 Green Foundry & Furnace Works, Des Moines, Ia.  
 Harvey-Whipple, Inc., Springfield, Mass.  
 Ideal Furnace Co., Detroit, Mich.  
 Keith Furnace Co., Des Moines, Ia.  
 Marshall Furnace Co., Marshall, Mich.

### FURNACES, WARM AIR, GRAVITY, OIL BURNING, STEEL

(Complete with burner)

- American Air Conditioning Corp., Sebastopol, Cal.  
 American Furnace Co., St. Louis, Mo.  
 Arcweld Mfg. Co., Inc., Seattle, Wash.  
 Armstrong Furnace Co., Columbus, O.  
 Auburn Burner Corp., Auburn, Ind.  
 Baker Furnace & Cleaner Mfg. Co., Toledo, O.  
 Cary Mfg. Co., Waupaca, Wis.  
 Century Engineering Corp., Cedar Rapids, Ia.  
 Des Moines Steel Furnace Co., Des Moines, Ia.  
 Edwards Mfg. Co., Inc., Cincinnati, O.  
 Forest City Foundries Co., Cleveland, O.  
 Gilbert & Barker Mfg. Co., Springfield, Mass.  
 Green Foundry & Furnace Works, Des Moines, Ia.  
 Hall-Neal Furnace Co., Indianapolis, Ind.  
 Hell Co., Milwaukee, Wis.  
 Hotentot Co., Inc., Omaha, Nebr.  
 Ingle Mfg. Co., San Diego, Cal.  
 Jackson & Church Co., Saginaw, Mich.  
 Joliet Heating Corp., Joliet, Ill.  
 Keith Furnace Co., Des Moines, Ia.  
 Koons Furnace Co., Danville, Ill.  
 Kruse Co., Inc., Indianapolis, Ind.  
 Lee Heating Systems, Youngstown, O.  
 Little Burner Co., Inc., H. C., San Rafael, Cal.  
 Lochinvar Corp., Dearborn, Mich.  
 Marshall Furnace Co., Marshall, Mich.  
 Meyer Furnace Co., Peoria, Ill.  
 Montag Stove & Furnace Works, Portland, Ore.  
 Motor Wheel Corp., Lansing, Mich.  
 National Mfg. & Engineering Co., Detroit, Mich.  
 Norge Heating & Conditioning Div., Borg-Warner Corp., Detroit, Mich.  
 Nu-Way Corp., Rock Island, Ill.  
 Oil Burner Builders, Inc., Bellevue, Ia.  
 Perfect Burner Co., Lynn, Mass.  
 Perfection Stove Co., Cleveland, O.  
 Quaker Mfg. Co., Chicago, Ill.  
 Relf-Rexoll, Inc., Buffalo, N. Y.  
 Scott-Newcomb, Inc., St. Louis, Mo.  
 Waterman-Waterbury Co., Minneapolis, Minn.  
 Wayne Oil Burner Corp., Fort Wayne, Ind.  
 Wood Industries, Inc., Gar, Detroit, Mich.  
 York Oil Burner Co., Inc., York, Pa.

### FURNACES, WARM AIR, GRAVITY, STOKER, CAST IRON

(Complete with stoker)

- American Foundry & Furnace Co., Bloomington, Ill.  
 Anchor Stove & Range Co., New Albany, Ind.  
 Excelsior Steel Furnace Co., Chicago, Ill.  
 Henry Furnace & Foundry Co., Cleveland, O.  
 Kelsey Heating Co., Inc., Syracuse, N. Y.  
 Majestic Co., Huntington, Ind.

### FURNACES, WARM AIR, GRAVITY, STOKER, CAST IRON

(No stoker furnished)

- Excelsior Steel Furnace Co., Chicago, Ill.  
 Henry Furnace & Foundry Co., Cleveland, O.  
 Keith Furnace Co., Des Moines, Ia.  
 Kelsey Heating Co., Inc., Syracuse, N. Y.  
 Majestic Co., Huntington, Ind.  
 Montag Stove & Furnace Works, Portland, Ore.  
 Mueller Furnace Co., L. J., Milwaukee, Wis.  
 Premier Furnace Co., Dowagiac, Mich.

### FURNACES, WARM AIR, GRAVITY, STOKER, STEEL

(Complete with stoker)

- Excelsior Steel Furnace Co., Chicago, Ill.  
 Hall-Neal Furnace Co., Indianapolis, Ind.  
 Henry Furnace & Foundry Co., Cleveland, O.  
 Hess Warming & Ventilating Co., Chicago, Ill.  
 Meyer Furnace Co., Peoria, Ill.

### FURNACES, WARM AIR, GRAVITY, STOKER, STEEL

(No stoker furnished)

- American Furnace & Foundry Co., Milan, Mich.  
 Arcweld Mfg. Co., Inc., Seattle, Wash.  
 Armstrong Furnace Co., Columbus, O.  
 Excelsior Steel Furnace Co., Chicago, Ill.  
 Fox Furnace Co., Elyria, O.  
 Hall-Neal Furnace Co., Indianapolis, Ind.  
 Henry Furnace & Foundry Co., Cleveland, O.  
 Hess Warming & Ventilating Co., Chicago, Ill.  
 "Home Comfort" Furnace & Mfg. Co., St. Louis, Mo.  
 Lenox Furnace Co., Marshalltown, Ia.  
 Meyer Furnace Co., Peoria, Ill.  
 Montag Stove & Furnace Works, Portland, Ore.  
 Mueller Furnace Co., L. J., Milwaukee, Wis.  
 Premier Furnace Co., Dowagiac, Mich.  
 Round Oak Co., Dowagiac, Mich.  
 Waterman-Waterbury Co., Minneapolis, Minn.

### FURNACES, WARM AIR, HORIZONTAL

- Acme Heating & Ventilating Co., Chicago, Ill.  
 American Foundry & Furnace Co., Bloomington, Ill.  
 Columbus Heating & Ventilating Co., Columbus, O.  
 Floral City Co., Monroe, Mich.  
 Forest City Foundries Co., Cleveland, O.  
 Gehrl Co., Tacoma, Wash.  
 Kruse & Dewenter Co., Indianapolis, Ind.  
 MaGirl Foundry & Furnace Works, P. H., Bloomington, Ill.  
 Majestic Co., Huntington, Ind.  
 McPherson Furnace & Supply Co., Portland, Ore.  
 Moncrief Furnace Co., Atlanta, Ga.  
 Montag Stove & Furnace Works, Portland, Ore.  
 Mueller Furnace Co., L. J., Milwaukee, Wis.  
 New York Blower Co., Chicago, Ill.  
 Rosebraugh Co., W. W., Salem, Ore.  
 Twentieth Century Heating & Ventilating Co., Akron, O.  
 Western Furnaces, Inc., Tacoma, Wash.  
 XXth Century Heating & Ventilating Co., Akron, O.

### FURNACES, WARM AIR, PIPELESS, CAST IRON

- Agricola Furnace Co., Inc., Gadsden, Ala.  
 American Foundry & Furnace Co., Bloomington, Ill.  
 American Furnace Co., St. Louis, Mo.  
 American Furnace & Foundry Co., Milan, Mich.  
 Andes Range & Furnace Corp., Geneva, N. Y.  
 Barry Furnace Co., Hamilton, O.  
 Brillion Furnace Co., Brillion, Wis.  
 Chandler Co., Cedar Rapids, Ia.  
 Danville Stove & Mfg. Co., Danville, Pa.  
 Detroit Michigan Stove Co., Detroit, Mich.  
 Dowagiac Steel Furnace Co., Dowagiac, Mich.  
 Edwards Furnace Co., Wellsboro, Pa.  
 Emrich Co., C., Columbus, O.  
 Enterprise Boiler & Tank Works, Inc., Chicago, Ill.  
 Enterprise Foundry Co., Belleville, Ill.  
 Excelsior Steel Furnace Co., Chicago, Ill.



- Excelsior Stove & Mfg. Co., Quincy, Ill.  
 Favorite Mfg. Co., Piqua, O.  
 Floral City Co., Monroe, Mich.  
 Floyd-Wells Co., Royersford, Pa.  
 Forest City Foundries Co., Cleveland, O.  
 ● Fox Furnace Co., Elyria, O.  
 Green Foundry & Furnace Works, Des Moines, Ia.  
 ● Hall-Neal Furnace Co., Indianapolis, Ind.  
 Harold Furnace Mfg. Co., Spokane, Wash.  
 Hart & Crouse Co., Inc., Utica, N. Y.  
 Hart Mfg. Co., Louisville, Ky.  
 Heckler Bros., Pittsburgh, Pa.  
 ● Henry Furnace & Foundry Co., Cleveland, O.  
 "Home Comfort" Furnace & Mfg. Co., St. Louis, Mo.  
 Home Furnace Co., Holland, Mich.  
 Home Stove Co., Indianapolis, Ind.  
 Ideal Furnace Co., Detroit, Mich.  
 International Heater Co., Utica, N. Y.  
 Johnston Gas Furnace Corp., Los Angeles, Cal. (Gas)  
 Kalamazoo Stove Co., Kalamazoo, Mich.  
 Kansas City Furnace Co., Kansas City, Mo.  
 Keith Furnace Co., Des Moines, Ia.  
 Kelsey Heating Co., Syracuse, N. Y.  
 Liberty Foundry Co., St. Louis, Mo.  
 MaGirl Foundry & Furnace Works, P. H. Bloomington, Ill.  
 Maple City Furnace Co., Monmouth, Ill.  
 Marshall Furnace Co., Marshall, Mich.  
 May-Fiebeger Co., Newark, O.  
 Montag Stove & Furnace Works, Portland, Ore.  
 Moore Corp., Joliet, Ill.  
 Mt. Vernon Furnace & Mfg. Co., Mt. Vernon, Ill.  
 ● Mueller Furnace Co., L. J., Milwaukee, Wis.  
 Orbon Stove Co., Belleville, Ill.  
 Pittsburgh Furnace Parts Co., Pittsburgh, Pa.  
 Pittston Stove Co., Pittston, Pa.  
 ● Premier Furnace Co., Dowagiac, Mich.  
 Ravenna Furnace & Heating Co., Ravenna, O.  
 Richardson & Boynton Co., New York City.  
 Robinson Furnace Co., Chicago, Ill.  
 ● Round Oak Co., Dowagiac, Mich.  
 Rudy Furnace Co., Dowagiac, Mich.  
 ● Rybolt Heater Co., Ashland, O.  
 St. Clair Foundry Corp., Centralia, Ill.  
 Schill Mfg. Co., Crestline, O.  
 ● Schwab Furnace & Mfg. Co., Milwaukee, Wis.  
 Security Stove & Mfg. Co., Kansas City, Mo.  
 ● Standard Foundry & Furnace Co., DeKalb, Ill.  
 Standard Furnace & Supply Co., Omaha, Nebr.  
 Stiglitz Furnace & Foundry Co., Louisville, Ky.  
 Thatcher Furnace Co., Newark, N. J.  
 ● Twentieth Century Heating & Ventilating Co., Akron, O.  
 Walker & Pratt Mfg. Co., Boston, Mass.  
 Ward Heater Co., Ltd., Los Angeles, Cal.  
 Washington Stove Works, Everett, Wash.  
 Western Furnaces, Inc., Tacoma, Wash.  
 Westwick & Son, Inc., John, Galena, Ill.  
 Williamson Heater Co., Cincinnati, O.  
 ● Wise Furnace Co., Akron, O.  
 ● XXth Century Heating & Ventilating Co., Akron, O.

### FURNACES, WARM AIR, PIPELESS, STEEL

- Aladdin Heating Corp., Oakland, Cal.  
 American Furnace & Foundry Co., Milan, Mich.  
 Arcweld Mfg. Co., Inc., Seattle, Wash.  
 ● Armstrong Furnace Co., Columbus, O.  
 Campbell Heating Co., Des Moines, Ia.  
 Daniels Mfg. Co., Inc., Sam, Hardwick, Vt.  
 Detroit Michigan Stove Co., Detroit, Mich.  
 Dowagiac Steel Furnace Co., Dowagiac, Mich.  
 Electrogas Furnace & Mfg. Co., San Francisco, Cal.  
 Enterprise Boiler & Tank Works, Inc., Chicago, Ill.  
 Floral City Co., Monroe, Mich.  
 Forest City Foundries Co., Cleveland, O.  
 ● Hall-Neal Furnace Co., Indianapolis, Ind.  
 Hart Mfg. Co., Louisville, Ky.  
 ● Henry Furnace & Foundry Co., Cleveland, O.  
 ● Hess Warming & Ventilating Co., Chicago, Ill.  
 "Home Comfort" Furnace & Mfg. Co., St. Louis, Mo.  
 Home Stove Co., Indianapolis, Ind.  
 Ideal Furnace Co., Detroit, Mich.  
 Ingle Mfg. Co., San Diego, Cal.  
 International Heater Co., Utica, N. Y.  
 Keith Furnace Co., Des Moines, Ia.  
 Kelsey Heating Co., Syracuse, N. Y.  
 Klein Stove Co., Philadelphia, Pa.  
 Koons Furnace Co., Danville, Ill.  
 Kruse & Dewenter Co., Indianapolis, Ind.  
 LaCrosse Tractor Co., LaCrosse, Wis.  
 Lennox Furnace Co., Marshalltown, Ia.  
 Liberty Foundry Co., St. Louis, Mo.  
 MaGirl Foundry & Furnace Works, P. H., Bloomington, Ill.  
 Majestic Furnace Co., Seattle, Wash.  
 Marshall Furnace Co., Marshall, Mich.  
 ● Meyer Furnace Co., Peoria, Ill.  
 Montag Stove & Furnace Works, Portland, Ore.  
 Nugent Sons, Inc., Thos., New York City  
 Orbon Stove Co., Belleville, Ill.  
 ● Pacific Gas Radiator Co., Los Angeles, Cal.  
 ● Payne Furnace & Supply Co., Beverly Hills, Cal.

- Peerless Foundry Co., Indianapolis, Ind.  
 Pennsylvania Furnace & Iron Co., Warren, Pa.  
 Pittsburgh Furnace Parts Co., Pittsburgh, Pa.  
 Roberts-Hamilton Co., Minneapolis, Minn.  
 Robinson Heating & Ventilating Corp., Massillon, O.  
 Rosebraugh Co., W. W., Salem, Ore.  
 Round Oak Co., Dowagiac, Mich.  
 Schill Mfg. Co., Crestline, O.  
 Stanton Heater Co., Martins Ferry, O.  
 Stiglitz Furnace & Foundry Co., Louisville, Ky.  
 Thompson Mfg. Co., Denver, Colo.  
 ● Twentieth Century Heating & Ventilating Co., Akron, O.  
 Ward Heater Co., Ltd., Los Angeles, Cal.  
 ● Waterman-Waterbury Co., Minneapolis, Minn.  
 ● Wise Furnace Co., Akron, O.  
 ● XXth Century Heating & Ventilating Co., Akron, O.

### GAGES, DRAFT

- Bacharach Industrial Instrument Co., Pittsburgh, Pa.  
 Bailey Meter Co., Cleveland, O.  
 Bristol Co., Waterbury, Conn.  
 Brown Instrument Co., Div. of Minneapolis-Honeywell Regulator Co., Philadelphia, Pa.  
 Cole-Sullivan Engineering Co., Minneapolis, Minn.  
 Ellison Draft Gage Co., Chicago, Ill.  
 Foxboro Co., Foxboro, Mass.  
 Friez & Sons, Inc., Julien P., Baltimore, Md.  
 Hays Corp., Michigan City, Ind.  
 Hill Co., E. Vernon, Chicago, Ill.  
 Hotstream Heater Co., The, Cleveland, O.  
 Manning, Maxwell & Moore, Inc., Bridgeport, Conn.  
 Moeller Instrument Co., Brooklyn, N. Y.  
 Precision Thermometer & Instrument Co., Philadelphia, Pa.  
 Preferred Utilities Mfg. Corp., New York City.

### GAS BURNERS

*See Burners, Gas, Conversion*

### GAS PRESSURE REGULATING VALVES

*See Valves, Gas Pressure Regulating*

### GLAZING COMPOUNDS

*See Compounds, Glazing*

### GRILLES, HEATING AND VENTILATING

- Aircraft Mfg. Co., Dayton, O.  
 American Blower Corp., Detroit, Mich.  
 ● American Foundry & Furnace Co., Bloomington, Ill.  
 American Instrument Co., Silver Springs, Md. (Low velocity air diffusers)  
 ● American Warming & Ventilating Co., Toledo, O.  
 Anemostat Corporation of America, New York City. (High velocity air diffusers)  
 ● Auer Register Co., Cleveland, O.  
 ● Barber-Colman Co., Rockford, Ill.  
 Best Register Co., Milwaukee, Wis.  
 Carrier Corp., Syracuse, N. Y.  
 Central Wire & Iron Works, Des Moines, Ia.  
 Chase Brass & Copper Co., Inc., Waterbury, Conn.  
 Chicago Perforating Co., Chicago, Ill.  
 Cincinnati Mfg. Co., Cincinnati, O.  
 Cross Engineering Co., Carbondale, Pa.  
 Decatur Iron & Steel Co., Decatur, Ala.  
 Diamond Mfg. Co., Wyoming, Pa.  
 ● Eckenroth Register Co., San Francisco, Cal.  
 Erdle Perforating Co., Rochester, N. Y.  
 Gillian Mfg. Co., Ferndale, Mich.  
 Globe Machine & Stamping Co., Cleveland, O.  
 ● Harrington & King Perforating Co., Chicago, Ill.  
 ● Hart & Cooley Mfg. Co., Chicago, Ill.  
 Hendrick Mfg. Co., Carbondale, Pa.  
 ● Independent Register Co., Cleveland, O.  
 Johnson & Chapman Co., Chicago, Ill.  
 ● Lamneck Products, Inc., Columbus, O.  
 Manhattan Perforated Metal Co., Inc., Long Island City, N. Y.  
 Metalace Corp., South Boston, Mass.  
 ● Mueller Furnace Co., L. J., Milwaukee, Wis.  
 Mundt & Sons, Charles, Jersey City, N. J.  
 Newman Brothers, Inc., Cincinnati, O.  
 ● Payne Furnace & Supply Co., Beverly Hills, Cal.  
 ● Register & Grille Mfg. Co., Inc., Brooklyn, N. Y.  
 Reliable Perforating Co., Chicago, Ill.  
 Roberts-Hamilton Co., Minneapolis, Minn.  
 ● Rock Island Register Co., Rock Island, Ill.  
 ● Trane Co., La Crosse, Wis.  
 ● Tuttle & Bailey, Inc., New Britain, Conn.  
 ● United States Register Co., Battle Creek, Mich.  
 ● Waterloo Register Co., Waterloo, Ia.  
 Western Wire & Iron Works, Inc., Chicago, Ill.  
 Wickwire Spencer Steel Co., New York City.

**GUARDS, SNOW**

- Berger Mfg. Co., Div. of Republic Steel Corp., Canton, O.  
 Chase Brass & Copper Co., Inc., Waterbury, Conn.  
 Danzer Metal Works Co., The, Hagerstown, Md.  
 Downs-Smith Brass & Copper Co., New York City.  
 Folsom Snow Guard Co., Boston, Mass.  
 •Hussey & Co., C. G., Pittsburgh, Pa. (Copper)  
 •Levow, David, New York City.  
 Maysteel Products, Inc., Mayville, Wis.  
 Southbridge Roofing Co., Inc., Southbridge, Mass.  
 Western Wire & Iron Works, Inc., Chicago, Ill.  
 Wickwire Spencer Steel Co., New York City.

**GUNS, SPRAY, PAINT**

- Binks Mfg. Co., Chicago, Ill.  
 De Vilbiss Co., Toledo, O.  
 Electric Spray Co., Milwaukee, Wis.  
 Imperial Brass Mfg. Co., Chicago, Ill.  
 Spray Engineering Co., Somerville, Mass.

**GUNS, SPRAY, METALS**

- Binks Mfg. Co., Chicago, Ill.  
 Metals Coating Co. of America, Philadelphia, Pa.

**GUTTERS**

*See Eaves Trough and Gutters*

**HEAT TRANSFER SURFACE**

*See Coils, Cooling, Direct Expansion; Coils, Heating; Coils, Cooling, Water*

**HEATERS, CABINET**

- Agricola Furnace Co., Inc., Gadsden, Ala.  
 American Furnace Co., St. Louis, Mo. (Gas and Oil).  
 •American Gas Products Corp., New York City.  
 American Radiator Co., New York City.  
 Beck Engineering Combustion Kompany, St. Louis, Mo.  
 Cary Mfg. Co., Waupaca, Wis.  
 Colonial Stove Co., Specialties Div., Philadelphia, Pa. (Gas)  
 Continental Stove Corp., Ironton, O. (Gas).  
 Corozone Air Conditioning Corp., Cleveland, O. (Gas).  
 Donley Brothers Co., Cleveland, O.  
 Emrich Co., C., Columbus, O.  
 Estate Stove Co., Hamilton, O.  
 Excelsior Stove & Mfg. Co., Quincy, Ill.  
 Floyd-Wells Co., Royersford, Pa.  
 Fox Engineering Co., Boston, Mass.  
 •Fox Furnace Co., Elyria, O.  
 Hart Mfg. Co., Louisville, Ky. (Coal and Gas).  
 Hayes Custer Stove Co., Bloomington, Ill.  
 Home Stove Co., Indianapolis, Ind.  
 Independence Stove & Furnace Co., Independence, Mo.  
 Ingle Mfg. Co., San Diego, Cal.  
 Kalamazoo Stove Co., Kalamazoo, Mich.  
 Little Burner Co., Inc., H. C., San Rafael, Cal. (Oil Burning).  
 •Lochinvar Corp., Dearborn, Mich. (Oil Burning).  
 Maysteel Products, Inc., Mayville, Wis.  
 Montag Stove & Furnace Works, Portland, Ore.  
 Moore Corp., Joliet, Ill.  
 Motor Wheel Corp., Lansing, Mich.  
 Mt. Vernon Furnace & Mfg. Co., Mt. Vernon, Ill. (Coal, Oil and Gas).  
 Norge Heating & Conditioning Div. of Borg-Warner Corp., Detroit, Mich. (Oil).  
 Odin Stove Mfg. Co., Erie, Pa. (Oil Fired).  
 Orbon Stove Co., Belleville, Ill.  
 •Pacific Gas Radiator Co., Los Angeles, Cal.  
 Patten Co., J. V., Sycamore, Ill. (Coal and Gas).  
 •Payne Furnace & Supply Co., Beverly Hills, Cal.  
 •Perfection Stove Co., Cleveland, O.  
 •Premier Furnace Co., Dowagiac, Mich.  
 Quaker Mfg. Co., Chicago, Ill. (Oil).  
 Resnor Mfg. Co., Mercer, Pa.  
 Rock Island Stove Co., Rock Island, Ill.  
 Schoedinger Co., F. O., Columbus, O.  
 Security Stove & Mfg. Co., Kansas City, Mo.  
 Silent Glow Oil Burner Corp., Hartford, Conn.  
 Silent Sioux Oil Burner Corp., Orange City, Ia. (Oil).  
 Texo Sales & Mfg. Co., Cincinnati, O. (Gas).  
 Viking Mfg. Co., Akron, O. (Oil).  
 Ward Heater Co., Ltd., Los Angeles, Cal.  
 •Waterman-Waterbury Co., Minneapolis, Minn.  
 Western Blower Co., Seattle, Wash.  
 York Oil Burner Co., Inc., York, Pa. (Oil).

**HEATERS, SCHOOL ROOM**

- Agricola Furnace Co., Inc., Gadsden, Ala.  
 •American Foundry & Furnace Co., Bloomington, Ill.  
 American Furnace & Foundry Co., Milan, Mich.

- Barry Furnace Co., Hamilton, O.  
 •Brillion Furnace Co., Brillion, Wis.  
 Campbell Heating Co., Des Moines, Ia.  
 •Chandler Co., Cedar Rapids, Ia.  
 Corozone Air Conditioning Corp., Cleveland, O.  
 Danville Stove & Mfg. Co., Danville, Pa.  
 Des Moines Steel Furnace Co., Des Moines, Ia. (Oil).  
 Detroit Michigan Stove Co., Detroit, Mich.  
 Dowagiac Steel Furnace Co., Dowagiac, Mich.  
 Edwards Furnace Co., Wellsboro, Pa.  
 Estate Stove Co., Hamilton, O.  
 Excelsior Stove & Mfg. Co., Quincy, Ill.  
 Farris Furnace Co., Springfield, Ill.  
 Floral City Co., Monroe, Mich.  
 •Fox Furnace Co., Elyria, O.  
 Harold Furnace Mfg. Co., Spokane, Wash.  
 Hart & Crouse Co., Inc., Utica, N. Y.  
 Hart Mfg. Co., Louisville, Ky. (Coal and Gas).  
 •Henry Furnace & Foundry Co., Cleveland, O.  
 Home Stove Co., Indianapolis, Ind.  
 International Heater Co., Utica, N. Y.  
 Keith Furnace Co., Des Moines, Ia.  
 Kelsey Heating Co., Syracuse, N. Y.  
 Koons Furnace Co., Danville, Ill.  
 Lennox Furnace Co., Marshalltown, Ia.  
 Little Burner Co., Inc., H. C., San Rafael, Cal.  
 MaGill Foundry & Furnace Works, P. H., Bloomington, Ill.  
 Maple City Furnace Co., Monmouth, Ill.  
 Marshall Furnace Co., Marshall, Mich.  
 •Meyer Furnace Co., Peoria, Ill.  
 Moncrief Furnace Co., Atlanta, Ga.  
 Moore Corp., Joliet, Ill.  
 Mt. Vernon Furnace & Mfg. Co., Mt. Vernon, Ill.  
 •Mueller Furnace Co., L. J., Milwaukee, Wis.  
 National Fan & Blower Corp., Chicago, Ill.  
 Orbon Stove Co., Belleville, Ill.  
 Patten Co., J. V., Sycamore, Ill.  
 •Payne Furnace & Supply Co., Beverly Hills, Cal.  
 •Perfection Stove Co., Cleveland, O.  
 Pittston Stove Co., Pittston, Pa.  
 Portland Stove Foundry Co., Portland, Me.  
 •Premier Furnace Co., Dowagiac, Mich.  
 Rock Island Stove Co., Rock Island, Ill.  
 •Round Oak Co., Dowagiac, Mich.  
 Rudy Furnace Co., Dowagiac, Mich.  
 St. Clair Foundry Corp., Centralia, Ill.  
 Silent Sioux Oil Burner Corp., Orange City, Ia. (Oil).  
 Sioux City Foundry and Boiler Co., Sioux City, Ia.  
 •Standard Foundry & Furnace Co., DeKalb, Ill.  
 Standard Furnace & Supply Co., Omaha, Nebr.  
 •Twentieth Century Heating & Ventilating Co., Akron, O.  
 •Waterman-Waterbury Co., Minneapolis, Minn.  
 Western Blower Co., Seattle, Wash.  
 Williamson Heater Co., Cincinnati, O.  
 •Wise Furnace Co., Akron, O.  
 •XXth Century Heating & Ventilating Co., Akron, O.

**HEATING COILS**

*See Coils, Heating*

**HUMIDIFIER FITTINGS**

*See Fittings, Humidifier, Water Line*

**HUMIDIFIER VALVES**

*See Valves, Humidifier, Water Level*

**HUMIDIFIERS, FURNACE, EVAPORATION, AUTOMATIC**

- Agricola Furnace Co., Inc., Gadsden, Ala.  
 Air Conditioning Supply Co., The, Cleveland, O.  
 •Air Controls, Inc., Cleveland, O.  
 American Air Conditioning Co., Minneapolis, Minn.  
 •American Foundry & Furnace Co., Bloomington, Ill.  
 American Furnace & Foundry Co., Milan, Mich.  
 •Automatic Humidifier Co., Cedar Falls, Ia.  
 Bishop Humidifier Co., Detroit, Mich.  
 Bryant Heater Co., Cleveland, O.  
 Cary Mfg. Co., Waupaca, Wis.  
 •Chandler Co., Cedar Rapids, Ia.  
 Clarm Mechanical Devices Co., Lima, O.  
 Des Moines Steel Furnace Co., Des Moines, Ia.  
 Dowagiac Steel Furnace Co., Dowagiac, Mich.  
 Electrogas Furnace & Mfg. Co., San Francisco, Cal.  
 Excelsior Steel Furnace Co., Chicago, Ill.  
 Falstrom Co., Passaic, N. J.  
 •Fox Furnace Co., Elyria, O.  
 Green Foundry & Furnace Works, Des Moines, Ia.  
 •Hall-Neal Furnace Co., Indianapolis, Ind.  
 Health-O-Mist Humidifier Mfg. Co., Columbus, Wis.  
 •Henry Furnace & Foundry Co., Cleveland, O.  
 Home Furnace Co., Holland, Mich.  
 Ideal Furnace Co., Detroit, Mich.  
 Iowa Foundry Co., Sioux City, Ia.



- Johnson Gas Appliance Co., Cedar Rapids, Ia.
- Kleenaire Corp., Stevens Point, Wis.
- Kraker, Henry, Holland, Mich.
- Little Burner Co., Inc., H. C., San Rafael, Cal.
- Maid-O'-Mist, Inc., Chicago, Ill.
- Marshall Furnace Co., Marshall, Mich.
- Meyer Furnace Co., Peoria, Ill.
- Monmouth Products Co., Cleveland, O.
- Mueller Furnace Co., L. J., Milwaukee, Wis.
- Pennsylvania Furnace & Iron Co., Warren, Pa.
- Perfect Burner Co., Lynn, Mass.
- Premier Furnace Co., Dowagiac, Mich.
- R-S Products Corp., Philadelphia, Pa.
- Richardson & Boynton Co., New York City.
- Roberts-Hamilton Co., Minneapolis, Minn.
- Round Oak Co., Dowagiac, Mich.
- Rudy Furnace Co., Dowagiac, Mich.
- Sallada Mfg. Co., Minneapolis, Minn.
- Security Stove & Mfg. Co., Kansas City, Mo.
- Sioux City Foundry and Boiler Co., Sioux City, Ia.
- Skilbeck Mfg. Co., Kenosha, Wis.
- Skuttle Co., J. L., Detroit, Mich.
- Somers, Inc., H. J., Detroit, Mich.
- Spray Engineering Co., Somerville, Mass.
- Thatcher Furnace Co., Newark, N. J.
- Universal Blower Co., Birmingham, Mich.
- Van Osdol Mfg. Co., Indianapolis, Ind.
- Viking Air Conditioning Corp., Cleveland, O.
- Waterman-Waterbury Co., Minneapolis, Minn.
- Western Blower Co., Seattle, Wash.
- Wisconsin Humidifier Co., Milwaukee, Wis.
- Wise Furnace Co., Akron, O.

### HUMIDIFIERS, FURNACE, SPRAY, AUTOMATIC

- American Foundry & Furnace Co., Bloomington, Ill.
- American Machine Products Co., Marshalltown, Ia.
- Binks Mfg. Co., Chicago, Ill.
- Bishop & Babcock Sales Co., Cleveland, O.
- Brundage Co., Kalamazoo, Mich.
- Bryant Corp., C. L., Cleveland, O.
- Bryant Heater Co., Cleveland, O.
- Electrogas Furnace & Mfg. Co., San Francisco, Cal.
- Fox Furnace Co., Elyria, O.
- Handelan Washed Air Co., Minneapolis, Minn.
- Lennox Furnace Co., Marshalltown, Ia.
- Meyer Furnace Co., Peoria, Ill.
- Mueller Furnace Co., L. J., Milwaukee, Wis.
- Oil Burner Builders, Inc., Bellevue, Ia.
- Parks-Cramer Co., Fitchburg, Mass.
- Rega Mfg. Co., Rochester, N. Y.
- Research Corp., New York City.
- Russell Electric Co., Chicago, Ill.
- Somers, Inc., H. J., Detroit, Mich.
- Southworth Machine Co., Portland, Me.
- Supreme Electric Products Corp., Rochester, N. Y.
- Thatcher Furnace Co., Newark, N. J.
- Thermal Units Mfg. Co., Meriden, Conn.
- United American Bosch Corp., Springfield, Mass.
- U. S. Air Conditioning Corp., Minneapolis, Minn.

### HUMIDISTATS

- Automatic Products Co., Milwaukee, Wis.
- Barber-Colman Co., Rockford, Ill.
- Bristol Co., Waterbury, Conn.
- Detroit Lubricator Co., Detroit, Mich.
- Friez & Sons, Inc., Julien P., Baltimore, Md. (Human hair element)
- H-B Instrument Co., Inc., Philadelphia, Pa.
- Johnson Service Co., Milwaukee, Wis. (Hair, Membrane, Wood)
- Johnson Tool Co., East Providence, R. I.
- Mayflower-Lewis Corp., St. Paul, Minn. (Hygroscopic paper element)
- Minneapolis-Honeywell Regulator Co., Minneapolis, Minn. (Human hair)
- Penn Electric Switch Co., Goshen, Ind. (Parchment)
- Perfex Corp., Milwaukee, Wis.
- Ripley Co., W. R. Tacoma, Wash. (Flexing)
- Spencer Thermostat Co., Attleboro, Mass.
- Standard Engineering Works, Pawtucket, R. I.
- Taylor Instrument Companies, Rochester, N. Y.

### HUMIDITY CONTROLS

See Humidistats

### HUMIDITY RECORDERS

See Recorders, Humidity

### HYGROMETERS

- Bristol Co., Waterbury, Conn.
- Brown Instrument Co., Div. of Minneapolis-Honeywell Regulator Co., Philadelphia, Pa.
- Friez & Sons, Inc., Julien P., Baltimore, Md.
- Johnson Service Co., Milwaukee, Wis.
- Taylor Instrument Companies, Rochester, N. Y.

### INDICATORS, SOUND LEVEL

- General Electric Co., Schenectady, N. Y.
- Johns-Manville, New York City.

### INSULATION, BUILDING

- Acme Asbestos Covering & Flooring Co., Chicago, Ill.
- Alfol Insulation Co., New York City.
- Alton Mineral Wool Co., Alton, Ill.
- Aluminum Co. of America, Pittsburgh, Pa. (Aluminum foil)
- American Flange & Mfg. Co., Inc., New York City.
- Armstrong Cork Products Co., Lancaster, Pa. (Cork)
- Bache Co., Semon, New York City. (Glass wool)
- Barrett Co., New York City. (Tar felt)
- Bird & Son, Inc., East Walpole, Mass.
- Cabot, Inc., Samuel, Boston, Mass.
- Carey Co., Philip, Lockland, Cincinnati, O.
- Celotex Corp., Chicago, Ill.
- Certain-teed Products Corp., New York City. (Rigid fibre)
- Cork Import Corp., New York City. (Corkboard)
- Cork Insulation Co., Inc., New York City. (Cork)
- Cornell Wood Products Co., Chicago, Ill.
- Eagle Picher Lead Co., Cincinnati, O. (Rockwool)
- Ehret Magnesia Mfg. Co., Valley Forge, Pa.
- General Insulating & Mfg. Co., Alexandria, Ind. (Blanket)
- General Insulating Products Co., Brooklyn, N. Y. (Rockwool)
- Hinde & Dauch Paper Co., Sandusky, O.
- Insulite Co., Minneapolis, Minn.
- Johns-Manville, New York City. (Rock wool, fibre board)
- Keasbey & Mattison Co., Ambler, Pa.
- Ludowici-Celadon Co., Chicago, Ill.
- Masonite Corp., Chicago, Ill.
- Mineral Felt Co., Toledo, O.
- Mineral Insulation Co., Chicago Ridge, Ill.
- Mundet Cork Corp., New York City. (Cork)
- National Gypsum Co., Buffalo, N. Y.
- Norristown Magnesia & Asbestos Co., Norristown, Pa.
- Owens-Illinois Glass Co., Toledo, O.
- Pacific Lumber Co., San Francisco, Cal. (Loose fill)
- Pacific States Felt & Mfg. Co., Inc., San Francisco, Cal.
- Reynolds Corp., New York City.
- Robertson Co., H. H., Pittsburgh, Pa.
- Rock Wool Products Co., Inc., Wabash, Ind.
- Ruberoid Co., New York City. (Rock wool)
- Russell Insulation Co., F. C., Baltimore, Md.
- Schundler & Co., Inc., F. E., Long Island City, N. Y.
- Smith & Kanzler, Inc., Elizabeth, N. J.
- Specialty Converters, Inc., Chicago, Ill.
- Sprayo-Flake Co., Chicago, Ill.
- Standard Asbestos Mfg. Co., Chicago, Ill.
- Standard Lime & Stone Co., Baltimore, Md.
- Therminsul Corp. of America, Kalamazoo, Mich.
- Truscon Steel Co., Youngstown, O.
- Union Fibre Co., Inc., Winona, Minn.
- United Cork Companies, Kearny, N. J.
- United States Gypsum Co., Chicago, Ill.
- U. S. Mineral Wool Co., New York City.
- Upson Co., Lockport, N. Y.
- Wilson, Inc., Grant, Chicago, Ill.
- Wilson & Co., Inc., Chicago, Ill. (Haircraft)
- Wood Conversion Co., St. Paul, Minn.
- Zonolite Corp. of Montana, Detroit, Mich.

### INSULATION, DUCT

- Acme Asbestos Covering & Flooring Co., Chicago, Ill.
- Alfol Insulation Co., New York City.
- American Flange & Mfg. Co., Inc., New York City.
- American Hair & Felt Co., Chicago, Ill.
- Armstrong Cork Products Co., Lancaster, Pa.
- Cabot, Inc., Samuel, Boston, Mass.
- Carey Co., Philip, Cincinnati, O.
- Celotex Corp., Chicago, Ill.
- Cork Import Corp., New York City. (Corkboard)
- Cork Insulation Co., Inc., New York City. (Cork)
- Eagle-Picher Lead Co., Cincinnati, O. (Rockwool blankets)
- Ehret Magnesia Mfg. Co., Valley Forge, Pa.
- General Insulating & Mfg. Co., Alexandria, Ind.
- General Insulating Products Co., Brooklyn, N. Y. (Acoustic rockwool)
- Insulite Co., Minneapolis, Minn.
- Johns-Manville, New York City. (Rock cork)
- Masonite Corp., Chicago, Ill.
- Maysteel Products, Inc., Mayville, Wis.
- Mineral Felt Co., Toledo, O.
- Mineral Insulation Co., Chicago Ridge, Ill.
- Mundet Cork Corp., New York City. (Cork)
- Owens-Illinois Glass Co., Toledo, O.
- Pacific States Felt & Mfg. Co., Inc., San Francisco, Cal.
- Presstite Engineering Co., St. Louis, Mo.
- Robertson Co., H. H., Pittsburgh, Pa.
- Rock Wool Products Co., Inc., Wabash, Ind.
- Ruberoid Co., New York City. (Asbestos cellular and laminated sheets)
- Russell Insulation Co., F. C., Baltimore, Md.
- Sall Mountain Co., Chicago, Ill.
- Schundler & Co., Inc., F. E., Long Island City, N. Y.
- Self-Vulcanizing Rubber Co., Inc., Chicago, Ill.



Smith & Kanzler, Inc., Elizabeth, N. J.  
 Sprayo-Flake Co., Chicago, Ill.  
 Standard Asbestos Mfg. Co., Chicago, Ill.  
 Therminul Corp. of America, Kalamazoo, Mich.  
 Union Fibre Co., Inc., Winona, Minn.  
 United Cork Companies, Kearny, N. J.  
 Western Felt Works, Chicago, Ill.  
 Wilson & Co., Inc., Chicago, Ill. (Hairbestos)  
 Wilson, Inc., Grant, Chicago, Ill.  
 Zonolite Corp. of Montana, Detroit, Mich.

### INSULATION, FURNACE AND PIPE

Alfol Insulation Co., New York City.  
 Carey Co., Philip, Lockland, Cincinnati, O.  
 General Insulating & Mfg. Co., Alexandria, Ind. (Blanket)  
 Eagle Picher Lead Co., Cincinnati, O. (Vercel Blocks)  
 Ehret Magnesia Mfg. Co., Valley Forge, Pa.  
 Johns-Manville, New York City. (All types)  
 Keasbey & Mattison Co., Ambler, Pa.  
 Mineral Insulation Co., Chicago Ridge, Ill.  
 Norristown Magnesia & Asbestos Co., Norristown, Pa.  
 Pacific States Felt & Mfg. Co., Inc., San Francisco, Cal.  
 Rock Wool Products Co., Inc., Wabash, Ind. (Rock Wool)  
 Ruberoid Co., New York City. (Asbestos & Magnesia)  
 Schundler & Co., Inc., F. E., Long Island City, N. Y.  
 Smith & Kanzler, Inc., Elizabeth, N. J.  
 Standard Asbestos Mfg. Co., Chicago, Ill.  
 Standard Lime & Stone Co., Baltimore, Md.  
 Therminul Corp., Kalamazoo, Mich.  
 Union Fibre Co., Inc., Winona, Minn.  
 Wilson, Inc., Grant, Chicago, Ill.  
 Zonolite Corp. of Montana, Detroit, Mich.

### INSULATION, SOUND DEADENING, DUCT

American Hair & Felt Co., Chicago, Ill.  
 Berry, Jr., F. E., & Co., Inc., Boston, Mass.  
 Burgess Battery Co., Chicago, Ill.  
 Cabot, Inc., Samuel, Boston, Mass.  
 Carey Co., Philip, Cincinnati, O.  
 Celotex Corp., Chicago, Ill.  
 Cork Import Corp., New York City. (Corkboard).  
 Cork Insulation Co., Inc., New York City. (Cork).  
 Ehret Magnesia Mfg. Co., Valley Forge, Pa.  
 Felters Co., Inc., Boston, Mass.  
 General Insulating Products Co., Brooklyn, N. Y.  
 Johns-Manville, New York City.  
 Keasbey & Mattison Co., Ambler, Pa.  
 Maysteel Products, Inc., Mayville, Wis.  
 Mineral Felt Co., Toledo, O.  
 Mortell Co., J. W., Chicago, Ill.  
 Nelson Mfg. Co., B. F., Minneapolis, Minn.  
 Pacific States Felt & Mfg. Co., Inc., San Francisco, Cal.  
 Prestite Engineering Co., St. Louis, Mo.  
 Russell Insulation Co., F. C., Baltimore, Md.  
 Schundler & Co., Inc., F. E., Long Island City, N. Y.  
 Smith & Kanzler, Inc., Elizabeth, N. J.  
 Sprayko-Flake Co., Chicago, Ill.  
 Therminul Corp., Kalamazoo, Mich.  
 Western Felt Works, Chicago, Ill.  
 Wilson, Inc., Grant, Chicago, Ill.  
 Zonolite Corp. of Montana, Detroit, Mich.

### LEADER STRAPS

*See Fittings and Accessories, Conductor*

### LIFTS, SKYLIGHT

Danser Metal Works Co., Hagerstown, Md.  
 Dayton Greenhouse Mfg. Co., Dayton, O.  
 Hudson Equipment Corp., Minneapolis, Minn.  
 •Levow, David, New York City. (Gearing)  
 Park City Cornice Works, Inc., Bridgeport, Conn.  
 Royal-Apex Mfg. Corp., Brooklyn, N. Y.  
 Schoedinger, F. O., Co., Columbus, O.  
 Van Noorden Co., E., Boston, Mass.  
 Weiss & Co., H., New York City.  
 Willis Mfg. Co., Galesburg, Ill.

### LININGS

*See Refractories*

### LOUVRES AND SHUTTERS

•Air Conditioning Products Co., Detroit, Mich.  
 Alrecon Industries, Detroit, Mich.  
 Aire-Folle Fan & Blower Co., Detroit, Mich.  
 •Allen Corp., Detroit, Mich.  
 American Coolair Corp., Jacksonville, Fla.  
 •American Foundry & Furnace Co., Bloomington, Ill.  
 American Sheet Metal Works, New Orleans, La.  
 •American Warming & Ventilating Co., Toledo, O.  
 Ames Co., W. R., San Francisco, Cal.

Andrews Lead Co., Inc., Long Island City, N. Y.  
 •Arex Co., Chicago, Ill.  
 Autovent Fan & Blower Co., Chicago, Ill.  
 •Barber-Colman Co., Rockford, Ill.  
 Bishop & Babcock Sales Co., Cleveland, O.  
 •Buffalo Forge Co., Buffalo, N. Y.  
 Burt Mfg. Co., Akron, O.  
 Campbell Heating Co., E. K., Kansas City, Mo.  
 Champion Blower & Forge Co., Lancaster, Pa.  
 Chicago Metal Mfg. Co., Chicago, Ill.  
 Clay Equipment Corp., Cedar Falls, Ia.  
 Danzer Metal Works Co., Hagerstown, Md.  
 Decatur Iron & Steel Co., Decatur, Ala.  
 Diamond Mfg. Co., Wyoming, Pa.  
 Economy Electric Manufacturing Co., Cicero, Ill.  
 •Elgo Shutter & Mfg. Co., Detroit, Mich.  
 Falstrom Co., Passaic, N. J.  
 General Regulator Corp., Chicago, Ill.  
 Gillian Mfg. Co., Ferndale, Mich.  
 Herrmann & Grace Co., Brooklyn, N. Y.  
 Hirschman Co., Inc., W. F., Buffalo, N. Y.  
 Jacobs Co., B. & J., Cincinnati, O.  
 •Jordan & Co., Paul R., Indianapolis, Ind.  
 Kirk & Blum Mfg. Co., Cincinnati, O.  
 Kleenaire Corp., Stevens Point, Wis.  
 Lamb & Ritchie Co., Cambridge, Mass.  
 Ledkote Products Co., Long Island City, N. Y.  
 Martin Metal Mfg. Co., Wichita, Kan.  
 Maysteel Products, Inc., Mayville, Wis.  
 Mountain States Equipment Co., Denver, Colo.  
 Myers Electric Co., Pittsburgh, Pa.  
 Perkinson & Brown, Chicago, Ill.  
 Providence Cornice Co., Providence, R. I.  
 Richmond Fireproof Door Co., Richmond, Ind.  
 Robertson Co., H. H., Pittsburgh, Pa.  
 Ryniker Sheet Metal Works, Inc., Billings, Mont.  
 Schoedinger Co., F. O., Columbus, O.  
 Tiffin Art Metal Co., Tiffin, O.  
 •Tuttle & Bailey, Inc., New Britain, Conn.  
 •United States Register Co., Battle Creek, Mich.  
 Van Noorden Co., E., Boston, Mass.  
 •Waterloo Register Co., Waterloo, Ia.  
 White Co., Kelvin & Wilfred B., Boston, Mass.  
 Willis Mfg. Co., Galesburg, Ill.  
 York Corrugating Co., York, Pa.

### MACHINERY, REBUILT AND USED

•Interstate Machinery Co., Inc., Chicago, Ill.  
 •Maplewood Machinery Co., Inc., Chicago, Ill.  
 •Osborn Co., J. M. & L. A., Cleveland, O.  
 •Ward Machinery Co., Chicago, Ill.

### MACHINES, CRIMPING

Bertsch & Co., Cambridge City, Ind.  
 Excelsior Tool and Machine Co., East St. Louis, Ill.  
 •Maplewood Machinery Co., Inc., Chicago, Ill.  
 New Albany Machine Mfg. Co., New Albany, Ind.  
 •Niagara Machine & Tool Works, Buffalo, N. Y.  
 Packham Crimper Co., Mechanicsburg, O.  
 •Peck, Stow & Wilcox Co., Southington, Conn.  
 Schatz Mfg. Co., Poughkeepsie, N. Y.  
 Swaine Mfg. Co., Fred J., St. Louis, Mo.  
 Yoder Co., Cleveland, O.

### MACHINES, ELBOW

•Maplewood Machinery Co., Inc., Chicago, Ill.  
 •Niagara Machine & Tool Works, Buffalo, N. Y.  
 •Peck, Stow & Wilcox Co., Southington, Conn.  
 Schatz Mfg. Co., Poughkeepsie, N. Y.

### MACHINES, FLANGING

"Original" Metal Forming Machine Co., Seattle, Wash.  
 •Ward Machinery Co., Chicago, Ill. (Hand)

### MACHINES, NIBBLING

•Campbell, Andrew C., Division of American Chain & Cable Co., Inc., Bridgeport, Conn.  
 Hendley & Whittemore Co., Beloit, Wis.  
 •Libert Machine Co., Green Bay, Wis.  
 National Machine Tool Co., Racine, Wis.  
 Pels & Co., Inc., Henry, New York City.  
 Rock River Machine Co., Inc., Janesville, Wis.  
 Savage Co., W. J., Knoxville, Tenn.  
 Schatz Mfg. Co., Poughkeepsie, N. Y.

### MACHINES, PITTSBURGH LOCK FORMING

•Ward Machinery Co., Chicago, Ill. (Power)

**MACHINES, SEAMING**

- Callahan Can Machine Co., Inc., Brooklyn, N. Y.
- Maplewood Machinery Co., Inc., Chicago, Ill.
- Niagara Machine & Tool Works, Buffalo, N. Y.
- Peck, Stow & Wilcox Co., Southington, Conn.
- Quickwork Co., St. Mary's, O.
- Schatz Mfg. Co., Poughkeepsie, N. Y.
- Swaine Mfg. Co., Fred J., St. Louis, Mo.
- Yoder Co., Cleveland, O.

**MACHINES, SLITTING**

- Bertsch & Co., Cambridge City, Ind.
- Callahan Can Machine Co., Inc., Brooklyn, N. Y.
- Hendley & Whittemore Co., Beloit, Wis.
- Maplewood Machinery Co., Inc., Chicago, Ill.
- Niagara Machine & Tool Works, Buffalo, N. Y.
- Peck, Stow & Wilcox Co., Southington, Conn.
- Quickwork Co., St. Mary's, O.
- Swaine Mfg. Co., Fred J., St. Louis, Mo.
- Yoder Co., Cleveland, O.

**MACHINES, WIRING**

- Callahan Can Machine Co., Inc., Brooklyn, N. Y.
- Cleveland Punch & Shear Works Co., Cleveland, O.
- Maplewood Machinery Co., Inc., Chicago, Ill.
- Niagara Machine & Tool Works, Buffalo, N. Y.
- Peck, Stow & Wilcox Co., Southington, Conn.
- Quickwork Co., St. Mary's, O.
- Schatz Mfg. Co., Poughkeepsie, N. Y.
- Swaine Mfg. Co., Fred J., St. Louis, Mo.
- Yoder Co., Cleveland, O.

**MAGNETIC SWITCHES**

*See Switches, Magnetic*

**METALS, PERFORATED, SHEET AND PLATE**

- Chase Brass & Copper Co., Inc., Waterbury, Conn.
- Chicago Perforating Co., Chicago, Ill.
- Cross Engineering Co., Carbondale, Pa.
- Crucible Steel Co., of America, New York City.
- Diamond Mfg. Co., Wyoming, Pa.
- Erdle Perforating Co., Rochester, N. Y.
- Gillian Mfg. Co., Ferndale, Mich.
- Hall Metal Products Co., Long Beach, Cal.
- Harrington & King Perforating Co., Chicago, Ill.
- Hendrick Mfg. Co., Carbondale, Pa.
- International Nickel Co., Inc., New York City. (Monel and Nickel)
- Johnston & Chapman Co., Chicago, Ill.
- Littleford Bros., Cincinnati, O.
- Manhattan Perforated Metal Co., Inc., Long Island City, N. Y.
- Metalace Corp., South Boston, Mass.
- Mundt & Sons, Charles, Jersey City, N. J.
- Nortmann-Duffke Co., Milwaukee, Wis.
- Reliable Perforating Co., Chicago, Ill.
- Revere Copper and Brass Incorporated, New York City.
- Standard Stamping & Perforating Co., Chicago, Ill.
- Western Wire & Iron Works, Inc., Chicago, Ill.
- Wickwire Spencer Steel Co., New York City.

**METAL SPRAY GUNS**

*See Guns, Spray, Metals*

**METAL STAMPINGS**

*See Stampings, Metal*

**METERS, AIR VELOCITY, DIRECT READING**

- Detroit Air Meter Co., Detroit, Mich.
- Friez & Sons, Inc., Julien P., Baltimore, Md.
- Illinois Testing Laboratories, Inc., Chicago, Ill.

**MOTORS, DAMPER, DUCT**

- Automatic Products Co., Milwaukee, Wis.
- Barber-Colman Co., Rockford, Ill.
- Cook Electric Co., Chicago, Ill.
- Detroit Lubricator Co., Detroit, Mich.
- General Controls Co., San Francisco, Cal., and Cleveland, O.
- Janette Mfg. Co., Chicago, Ill.
- Mercoild Corp., Chicago, Ill.
- Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
- Perfex Corp., Milwaukee, Wis.
- Russell Electric Co., Chicago, Ill.
- Sheer Co., H. M., Quincy, Ill.
- White Mfg. Co., St. Paul, Minn.

**MOTORS, DAMPER, FURNACE DRAFT, ELECTRICAL**

- Automatic Products Co., Milwaukee, Wis.
- Barber-Colman Co., Rockford, Ill.
- Cook Electric Co., Chicago, Ill.
- Crise Elec. Mfg. Co., Mount Vernon, O.
- Detroit Lubricator Co., Detroit, Mich.
- General Controls Co., San Francisco, Cal., and Cleveland, O.
- Gleason-Avery, Inc., Auburn, N. Y.
- Goesse Mfg. Co., Milwaukee, Wis.
- Mercoild Corp., Chicago, Ill.
- Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
- Modern Heat Regulator Co., Cleveland, O.
- Perfex Corp., Milwaukee, Wis.
- Pioneer Heat Regulator Division, Master Electric Co., Dayton, O.
- Russell Electric Co., Chicago, Ill.
- Sheer Co., H. M., Quincy, Ill.
- White Mfg. Co., St. Paul, Minn.

**MOTORS, ELECTRIC, FRACTIONAL H. P.**

- Allis Co., Louis, Milwaukee, Wis.
- Baldor Electric Co., St. Louis, Mo.
- Barber-Colman Co., Rockford, Ill. (A. C.)
- Black & Decker Mfg. Co., Towson, Md.
- Bodine Electric Co., Chicago, Ill.
- Brown-Brockmeyer Co., Inc., Dayton, O.
- Burke Electric Co., Erie, Pa.
- Century Electric Co., St. Louis, Mo.
- Continental Electric Co., Inc., Newark, N. J.
- Delco Products Division, General Motors Corp., Dayton, O.
- Diehl Mfg. Co., Elizabeth, N. J.
- Duro Co., Dayton, O.
- Emerson Electric Mfg. Co., St. Louis, Mo.
- General Electric Co., Schenectady, N. Y.
- Harnischfeger Corp., Milwaukee, Wis.
- Holtzer-Cabot Electric Co., Boston, Mass.
- Howell Electric Motors Co., Howell, Mich.
- Imperial Electric Co., Akron, O.
- Janette Mfg. Co., Chicago, Ill.
- Leland Electric Co., Dayton, O.
- Marathon Electric Mfg. Corp., Wausau, Wis.
- Master Electric Co., Dayton, O.
- Ohio Electric Mfg. Co., Cleveland, O.
- Peerless Electric Co., Warren, O.
- Robbins & Myers, Inc., Springfield, O.
- Signal Electric Mfg. Co., Menominee, Mich.
- Speedway Mfg. Co., Cicero, Ill.
- Victor Electric Products, Inc., Cincinnati, O.
- Wagner Electric Corp., St. Louis, Mo.
- Westinghouse Electric & Mfg. Co., Mansfield, O.

**MOTORS, ELECTRIC, 1 H. P. AND OVER**

- Allis Co., Louis, Milwaukee, Wis.
- Allis-Chalmers Mfg. Co., Milwaukee, Wis.
- Baldor Electric Co., St. Louis, Mo.
- Brown-Brockmeyer Co., Inc., Dayton, O.
- Burke Electric Co., Erie, Pa.
- Century Electric Co., St. Louis, Mo.
- Continental Electric Co., Inc., Newark, N. J.
- Crocker-Wheeler Elec. Mfg. Co., Ampere, N. J.
- Delco Products Division, General Motors Corp., Dayton, O.
- Diehl Mfg. Co., Elizabeth, N. J.
- Duro Co., Dayton, O.
- Emerson Electric Mfg. Co., St. Louis, Mo.
- Fairbanks, Morse & Co., Chicago, Ill.
- General Electric Co., Schenectady, N. Y.
- Harnischfeger Corp., Milwaukee, Wis.
- Holtzer-Cabot Electric Co., Boston, Mass.
- Howell Electric Motors Co., Howell, Mich.
- Ideal Electric & Mfg. Co., Mansfield, O.
- Imperial Electric Co., Akron, O.
- Janette Mfg. Co., Chicago, Ill.
- Leland Electric Co., Dayton, O.
- Lincoln Electric Co., Cleveland, O.
- Master Electric Co., Dayton, O.
- Peerless Electric Co., Warren, O.
- Reliance Electric & Engineering Co., Cleveland, O.
- Robbins & Myers, Inc., Springfield, O.
- Star Electric Motor Co., Bloomfield, N. J.
- Wagner Electric Corp., St. Louis, Mo.
- Westinghouse Electric & Mfg. Co., Mansfield, O.

**MOULDING AND TRIM, ORNAMENTAL, for CABINETS and CASINGS**

- Allmetal Weatherstrip Co., Chicago, Ill.
- Aluminum Co. of America, Pittsburgh, Pa.
- Brasco Mfg. Co., Harvey, Ill.
- Chase Brass & Copper Co., Inc., Waterbury, Conn.
- Empire Door Co., Inc., New York City.
- Falstrom Co., Passaic, N. J.
- Friedley-Voshardt Co., Chicago, Ill.
- Gillian Mfg. Co., Ferndale, Mich.
- Herron-Zimmers Moulding Co., Detroit, Mich.
- Ledkote Products Co., Long Island City, N. Y.
- Mesker & Co., Geo. L., Evansville, Ind.
- Miller & Doing, Inc., Brooklyn, N. Y.
- Perrin Co., Edward C., Camden, N. J.

**NAILS, ALUMINUM**

Aluminum Company of America, Pittsburgh, Pa.  
Hassall, Inc., John, Brooklyn, N. Y.  
Townsend Co., New Brighton, Pa.

**NAILS, COPPER**

American Steel & Wire Co., Chicago, Ill.  
Angell Nail & Chaplet Co., Cleveland, O.  
Chase Brass & Copper Co., Inc., Waterbury, Conn.  
Columbia Steel Co., San Francisco, Cal.  
Copperweld Steel Co., Glassport, Pa.  
Hassall, Inc., John, Brooklyn, N. Y.  
•Hussey & Co., C. G., Pittsburgh, Pa.  
Maze Co., W. H., Peru, Ill.  
Royal Metal Products Co., Brooklyn, N. Y.  
Townsend Co., New Brighton, Pa.  
Turner & Seymour Mfg. Co., Torrington, Conn.

**NAILS, HARDENED MASONRY**

American Steel Co., Pittsburgh, Pa.  
American Steel & Wire Co., Chicago, Ill.  
Rawplug Co., Inc., New York City.  
Ruberoid Co., New York City.  
Townsend Co., New Brighton, Pa.  
Wheeling Corrugating Co., Wheeling, W. Va.  
Wheeling Steel Corp., Wheeling, W. Va.

**NAILS, ROOFING**

American Steel & Wire Co., Chicago, Ill.  
Angell Nail & Chaplet Co., Cleveland, O.  
Berger Mfg. Co., Div. of Republic Steel Corp., Canton, O.  
Bethlehem Steel Co., Bethlehem, Pa.  
Chase Brass & Copper Co., Inc., Waterbury, Conn.  
Columbia Steel Co., San Francisco, Cal.  
Continental Steel Corp., Kokomo, Ind.  
Deniston Co., Chicago, Ill.  
Dickson Weatherproof Nail Co., Evanston, Ill. (Lead Headed)  
Edwards Mfg. Co., Inc., Cincinnati, O.  
Gulf States Steel Co., Birmingham, Ala.  
Hassall, Inc., John, Brooklyn, N. Y.  
•Hussey & Co., C. G., Pittsburgh, Pa.  
Jones & Laughlin Steel Corp., Pittsburgh, Pa.  
Malleable Iron Fittings Co., Branford, Conn.  
Maze Co., W. H., Peru, Ill.  
National Lead Co., New York City.  
•Republic Steel Corp., Cleveland, O.  
Tennessee Coal, Iron & Railroad Co., Birmingham, Ala.  
Townsend Co., New Brighton, Pa.  
Turner & Seymour Mfg. Co., Torrington, Conn.  
Wheeling Corrugating Co., Wheeling, W. Va.  
Wheeling Steel Corp., Wheeling, W. Va.  
•Youngstown Sheet & Tube Co., Youngstown, O.

**NAILS, SCREW, HARDENED**

National Screw & Mfg. Co., Cleveland, O.  
•Parker-Kalon Corp., New York City.  
•Republic Steel Corp., Cleveland, O.  
Townsend Co., New Brighton, Pa.

**NAILS, STAINLESS STEEL**

Anti-Corrosive Metal Products Co., Inc., Castleton-on-Hudson, N. Y.  
•Republic Steel Corp., Cleveland, O.  
Turner & Seymour Mfg. Co., Torrington, Conn.

**NAILS, ZINC COATED**

American Steel & Wire Co., Chicago, Ill.  
American Zinc Products Co., Greencastle, Ind.  
Angell Nail & Chaplet Co., Cleveland, O.  
Berger Mfg. Co., Div. of Republic Steel Corp., Canton, O.  
Bethlehem Steel Co., Bethlehem, Pa.  
Columbia Steel Co., San Francisco, Cal.  
Continental Steel Corp., Kokomo, Ind.  
Gulf States Steel Co., Birmingham, Ala.  
Hassall, Inc., John, Brooklyn, N. Y.  
Jones & Laughlin Steel Corp., Pittsburgh, Pa.  
Malleable Iron Fittings Co., Branford, Conn.  
Maze Co., W. H., Peru, Ill.  
Tennessee Coal, Iron & Railroad Co., Birmingham, Ala. (Galvanized)  
Townsend Co., New Brighton, Pa.  
Wheeling Corrugating Co., Wheeling, W. Va.  
Wheeling Steel Corp., Wheeling, W. Va.  
•Youngstown Sheet & Tube Co., Youngstown, O.

**NIGHT AIR FANS**

*See Fans, Night Air Cooling*

**NOZZLES, SPRAY**

Balloffett Dies & Nozzle Co., Inc., Guttenberg, N. J.  
Binks Mfg. Co., Chicago, Ill.  
Bishop & Babcock Sales Co., Cleveland, O.  
•Buffalo Forge Co., Buffalo, N. Y.  
Detroit Lubricator Co., Detroit, Mich.  
•Fries & Sons, Inc., Julien P., Baltimore, Md.  
Grinnell Co., Inc., Providence, R. I.  
Harsch Co., Inc., H., Maplewood, N. J.  
Howell Mfg. Co., Kansas City, Mo.  
Hubbard Co., Minneapolis, Minn.  
Johnson Tool Co., Inc., East Providence, R. I.  
•Marley Co., Kansas City, Mo.  
Martocello & Co., Jos. A., Philadelphia, Pa.  
Monarch Mfg. Works, Inc., Philadelphia, Pa.  
National Air Conditioning Engineering Corp., Kansas City, Mo.  
Preferred Utilities Mfg. Corp., New York City.  
Rega Mfg. Co., Rochester, N. Y.  
Spray Engineering Co., Somerville, Mass.  
Sturtevant Co., B. F., Hyde Park, Boston, Mass.  
Supreme Electric Products Corp., Rochester, N. Y.  
•Trane Co., LaCrosse, Wis.

**OFFSETS, FURNACE PIPE**

*See Fittings and Accessories, Furnace Pipe*

**OIL BURNER CONTROLS**

*See Controls, Oil Burner*

**OIL BURNERS**

*See Burners, Oil*

**OZONIZERS**

Auburn Automobile Co., Air Cond. Div., Chicago, Ill., and Connorsville, Ind.  
Corozone Air Conditioning Corp., Cleveland, O.  
Electroaire Corp., Chicago, Ill.  
Fresh'nd-Aire Co., Chicago, Ill.  
Montgomery Bros., San Francisco, Cal.  
Polar Air, Inc., Dallas, Tex.  
Sealkote Corp., Chicago, Ill.  
Triox Engineering Co., St. Louis, Mo.

**PAINT, ALUMINUM**

Acme Refining Co., Cleveland, O.  
Aluminum Company of America, Pittsburgh, Pa.  
Asphalt Products Co., Syracuse, N. Y.  
Calbar Paint & Varnish Co., Philadelphia, Pa.  
Carter Paint Co., Liberty, Ind.  
Connors Paint Mfg. Co., Wm., Troy, N. Y.  
Continental Products Co., Euclid, O.  
Cork Import Corp., New York City.  
Gerard Chemical Co., Elizabeth, N. J.  
Glidden Co., Cleveland, O.  
Hague & Co., Inc., Alfred, Brooklyn, N. Y.  
Heath & Milligan Mfg. Co. Div. of Glidden Co., Chicago, Ill.  
Horn Co., A. C., Long Island City, N. Y.  
Iowa Paint Mfg. Co., Des Moines, Ia.  
Koppers Co., Tar and Chemical Div., Pittsburgh, Pa.  
Lastik Products Co., Inc., Pittsburgh, Pa.  
National Mfg. Corp., Tonawanda, N. Y.  
Ohmlac Paint & Refining Co., Chicago, Ill.  
•Pyrolite Products Co., Cleveland, O.  
Reynolds Corp., New York City.  
Roxalin Flexible Lacquer Co., Elizabeth, N. J.  
Technical Coatings, Inc., New York City.  
Thompson & Co., Pittsburgh, Pa.  
Tropical Paint & Oil Co., Cleveland, O.  
Wilhelm Co., A., Reading, Pa.

**PAINT, ASBESTOS**

Barber Co., Inc., Philadelphia, Pa.  
Calbar Paint & Varnish Co., Philadelphia, Pa.  
Carter Paint Co., Liberty, Ind.  
Connors Paint Mfg. Co., Wm., Troy, N. Y.  
Flintkote Co., New York City.  
Glidden Co., Cleveland, O.  
Hague & Co., Inc., Alfred, Brooklyn, N. Y.  
Heath & Milligan Mfg. Co., Div. of Glidden Co., Chicago, Ill.  
Hetzl Roofing Products Co., Newark, N. J.  
Horn Co., A. C., Long Island City, N. Y.  
Iowa Paint Mfg. Co., Des Moines, Ia.  
Lastik Products Co., Inc., Pittsburgh, Pa.  
Metropolitan Refining Co., Long Island City, N. Y.  
Miller & Son, C. Arthur, Elmira, N. Y.



National Mfg. Corp., Tonawanda, N. Y.  
 Ohmlac Paint & Refining Co., Chicago, Ill.  
 •Pyrolite Products Co., Cleveland, O.  
 Ruberoid Co., New York City.  
 Sauereisen Cements Co., Sharpsburg, Pa.  
 Tamms Silica Co., Chicago, Ill.  
 Thompson & Co., Pittsburgh, Pa.  
 Tropical Paint & Oil Co., Cleveland, O.  
 Wilhelm Co., A., Reading, Pa.  
 Wilson, Inc., Grant, Chicago, Ill.

### PAINT, CONCRETE, WATERPROOFING

Acme Refining Co., Cleveland, O.  
 Asphalt Products Co., Syracuse, N. Y.  
 Barber Co., Inc., Philadelphia, Pa.  
 Barrett Co., New York City.  
 Cabot, Inc., Samuel, Boston, Mass.  
 Calbar Paint & Varnish Co., Philadelphia, Pa.  
 Connors Paint Mfg. Co., Wm., Troy, N. Y.  
 Flintkote Co., New York City.  
 Gerard Chemical Co., Elizabeth, N. J.  
 Glidden Co., Cleveland, O.  
 Goodrich Co., B. F., Akron, O.  
 Hague & Co., Inc., Alfred, Brooklyn, N. Y.  
 Heath & Milligan Mfg. Co., Div. of Glidden Co., Chicago, Ill.  
 Horn Co., A. C., Long Island City, N. Y.  
 Iowa Paint Mfg. Co., Des Moines, Ia.  
 Koppers Co., Tar and Chemical Div., Pittsburgh, Pa.  
 Lastik Products Co., Inc., Pittsburgh, Pa.  
 Metropolitan Refining Co., Long Island City, N. Y.  
 Ohmlac Paint & Refining Co., Chicago, Ill.  
 Pecora Paint Co., Philadelphia, Pa.  
 •Pyrolite Products Co., Cleveland, O.  
 Ruberoid Co., New York City.  
 Self-Vulcanizing Rubber Co., Inc., Chicago, Ill.  
 Tamms Silica Co., Chicago, Ill.  
 Thompson & Co., Pittsburgh, Pa.  
 Tropical Paint & Oil Co., Cleveland, O.  
 Truscon Laboratories, Detroit, Mich.  
 United States Gypsum Co., Chicago, Ill.  
 Wilhelm Co., A., Reading, Pa.

### PAINT, COPPER

American Coppercote, Inc., Brooklyn, N. Y.

### PAINT, CRACKLE FINISH

Glidden Co., Cleveland, O.  
 Hague & Co., Inc., Alfred, Brooklyn, N. Y.  
 Heath & Milligan Mfg. Co., Div. of Glidden Co., Chicago, Ill.  
 Iowa Paint Mfg. Co., Des Moines, Ia.  
 Roxalin Flexible Lacquer Co., Elizabeth, N. J.  
 Tropical Paint & Oil Co., Cleveland, O.  
 Wattenamel Co., Summit, Ill.  
 Wilhelm Co., A., Reading, Pa.  
 Zapon-Brevolite Division, Atlas Powder Co., North Chicago, Ill.

### PAINT, HOT SURFACES

Acme Refining Co., Cleveland, O.  
 American Chemical Paint Co., Ambler, Pa.  
 Barrett Co., New York City.  
 Cabot, Inc., Samuel, Boston, Mass.  
 Calbar Paint & Varnish Co., Philadelphia, Pa.  
 Carey Co., Philip, Lockland, Cincinnati, O.  
 Carter Paint Co., Liberty, Ind.  
 Continental Products Co., Euclid, O.  
 Gerard Chemical Co., Elizabeth, N. J.  
 Glidden Co., Cleveland, O.  
 Hague & Co., Inc., Alfred, Brooklyn, N. Y.  
 Heath & Milligan Mfg. Co., Div. of Glidden Co., Chicago, Ill.  
 Hetzel Roofing Products Co., Newark, N. J.  
 Horn Co., A. C., Long Island City, N. Y.  
 Iowa Paint Mfg. Co., Des Moines, Ia.  
 •Laclede-Christy Clay Products Co., St. Louis, Mo.  
 Metropolitan Refining Co., Long Island City, N. Y.  
 National Mfg. Corp., Tonawanda, N. Y.  
 Ohmlac Paint & Refining Co., Chicago, Ill.  
 •Pyrolite Products Co., Cleveland, O.  
 Roxalin Flexible Lacquer Co., Elizabeth, N. J.  
 Sauereisen Cements Co., Sharpsburg, Pa.  
 Technical Coatings, Inc., New York City.  
 Thompson & Co., Pittsburgh, Pa.  
 Tropical Paint & Oil Co., Cleveland, O.  
 Walsh Refractories Corp., St. Louis, Mo.  
 Wilhelm Co., A., Reading, Pa.

### PAINT, ROOFING

Acme Refining Co., Cleveland, O.  
 Asphalt Products Co., Syracuse, N. Y.

Barber Co., Inc., Philadelphia, Pa. (Asphalt).  
 Barrett Co., New York City. (Pitch).  
 Bird & Son, Inc., East Walpole, Mass.  
 Cabot, Inc., Samuel, Boston, Mass.  
 Calbar Paint & Varnish Co., Philadelphia, Pa.  
 Carey Co., Philip, Lockland, Cincinnati, O.  
 Certain-teed Products Corp., New York City.  
 Clinton Metallic Paint Co., Clinton, N. Y. (Red Metallic and Venetian).  
 Continental Products Co., Euclid, O. (All kinds).  
 Glidden Co., Cleveland, O.  
 Heath & Milligan Mfg. Co., Division of Glidden Co., Chicago, Ill. (All kinds).  
 Horn Co., A. C., Long Island City, N. Y.  
 Iowa Paint Mfg. Co., Des Moines, Ia. (Asphalt).  
 Koppers Co., Tar and Chemical Div., Pittsburgh, Pa. (Bituminous).  
 Lastik Products Co., Inc., Pittsburgh, Pa. (Asphalt, Tar).  
 Ohmlac Paint & Refining Co., Chicago, Ill. (Asphalt).  
 Pecora Paint Co., Philadelphia, Pa.  
 •Pyrolite Products Co., Cleveland, O. (Asbestos, Asphalt and Tar)  
 Ruberoid Co., New York City. (Asphalt and Tar).  
 Rutland Fire Clay Co., Rutland, Vt. (Asphalt).  
 Thompson & Co., Pittsburgh, Pa.  
 Wilhelm Co., A., Reading, Pa.

### PAINT SPRAY GUNS

See Guns, Spray, Paint

### PAPER, ASBESTOS

Carey Co., Philip, Lockland, Cincinnati, O.  
 Ehret Magnesia Mfg. Co., Valley Forge, Pa.  
 Johns-Manville, New York City.  
 Norristown Magnesia & Asbestos Co., Norristown, Pa.  
 Pacific States Felt & Mfg. Co., Inc., San Francisco, Cal.  
 Ruberoid Co., New York City.  
 •Sail Mountain Co., Chicago, Ill.  
 Smith & Kanzler, Inc., Elizabeth, N. J.  
 Standard Asbestos Mfg. Co., Chicago, Ill.  
 Wilson, Inc., Grant, Chicago, Ill.

### PASTE, ASBESTOS PAPER

Clark Stek-O Corp., Rochester, N. Y.  
 Ehret Magnesia Mfg. Co., Valley Forge, Pa.  
 Keasbey & Mattison Co., Ambler, Pa.  
 •Meyer & Bro. Co., F., Peoria, Ill.  
 Norristown Magnesia & Asbestos Co., Norristown, Pa.  
 Ruberoid Co., New York City.  
 Rutland Fire Clay Co., Rutland, Vt.  
 •Sail Mountain Co., Chicago, Ill.  
 Smith & Kanzler, Inc., Elizabeth, N. J.  
 Standard Asbestos Mfg. Co., Chicago, Ill.  
 Wilson, Inc., Grant, Chicago, Ill.

### PERFORATED METALS

See Metals, Perforated, Sheet and Plate

### PIPE, CONDUCTOR

Ames Co., W. R., San Francisco, Cal.  
 Barnes Metal Products Co., Chicago, Ill.  
 •Berger Bros. Co., Philadelphia, Pa.  
 Berger Mfg. Co., Div. of Republic Steel Corp., Canton, O.  
 Braden Mfg. Co., Terre Haute, Ind.  
 Budke Stamping Co., Canonsburg, Pa.  
 Chase Brass & Copper Co., Inc., Waterbury, Conn.  
 Chicago Metal Mfg. Co., Chicago, Ill.  
 Cincinnati Sheet Metal & Roofing Co., Cincinnati, O.  
 Danzer Metal Works Co., Hagerstown, Md.  
 Decatur Iron & Steel Co., Decatur, Ala.  
 Downs-Smith Brass & Copper Co., New York City.  
 •Hussey & Co., C. G., Pittsburgh, Pa. (Copper)  
 La Crosse Steel Roofing & Corrugating Co., La Crosse, Wis.  
 Lamb & Ritchie Co., Cambridge, Mass.  
 •Lyon, Conklin & Co., Inc., Baltimore, Md.  
 Martin Metal Mfg. Co., Wichita, Kan.  
 •Milcor Steel Co., Milwaukee, Wis.  
 Miller & Doing, Inc., Brooklyn, N. Y.  
 New Delphos Mfg. Co., Delphos, O.  
 Norman Sheet Metal Mfg. Co., W. F., Nevada, Mo.  
 •Osborn Co., J. M. & L. A., Cleveland, O.  
 Providence Cornice Co., Providence, R. I.  
 Reeves Steel & Mfg. Co., Dover, O.  
 Schoedinger Co., F. O., Columbus, O.  
 Sheet Metal Products Co., Peoria, Ill.  
 Southbridge Roofing Co., Inc., Southbridge, Mass.  
 Southern States Iron Roofing Co., Savannah, Ga.  
 Tiffin Art Metal Co., Tiffin, O.  
 Watson Co., Inc., Jas. H., Bradley, Ill.  
 Wheeling Corrugating Co., Wheeling, W. Va.  
 Wilder Manufacturing Co., Niles, O.  
 Woolwine Metal Products Co., Los Angeles, Cal.  
 York Corrugating Co., York, Pa.

## PIPE, FURNACE

- Acer & Whedon, Inc., Medina, N. Y.  
 Acme Tin Plate & Roofing Supply Co., Philadelphia, Pa.  
 Berger Mfg. Co., Div. of Republic Steel Corp., Canton, O.  
 Braden Mfg. Co., Terre Haute, Ind.  
 Budke Stamping Co., Canonsburg, Pa.  
 Chicago Furnace Supply Co., Chicago, Ill.  
 Chicago Metal Mfg. Co., Chicago, Ill.  
 Cincinnati Sheet Metal & Roofing Co., Cincinnati, O.  
 Cincinnati Stamping Co., Cincinnati, O.  
 Corbman Bros., Inc., Philadelphia, Pa.  
 Danzer Metal Works Co., Hagerstown, Md.  
 Detroit Safety Furnace Pipe Co., Detroit, Mich.  
 Edwards Furnace Co., Wellsboro, Pa.  
 Excelsior Steel Furnace Co., Chicago, Ill.  
 Excelsior Stove & Mfg. Co., Quincy, Ill.  
 Gray Metal Products, Inc., Rochester, N. Y.  
 Green Foundry & Furnace Works, Des Moines, Ia.  
 • Henry Furnace & Foundry Co., Cleveland, O.  
 Home Furnace Co., Holland, Mich.  
 Howes Co., S. M., Charlestown, Boston, Mass.  
 International Heater Co., Utica, N. Y.  
 La Crosse Steel Roofing & Corrugating Co., La Crosse, Wis.  
 • Lamneck Products, Inc., Columbus, O.  
 Lennox Furnace Co., Marshalltown, Ia.  
 • Lyon, Conklin & Co., Inc., Baltimore, Md.  
 Majestic Co., Huntington, Ind.  
 Maple City Furnace Co., Monmouth, Ill.  
 Martin Bros., Rochester, N. Y.  
 Martin Metal Mfg. Co., Wichita, Kan.  
 • Meyer & Bro. Co., F., Peoria, Ill.  
 • Milcor Steel Co., Milwaukee, Wis.  
 • Mueller Furnace Co., L. J., Milwaukee, Wis.  
 Norman Sheet Metal Mfg. Co., W. F., Nevada, Mo.  
 • Osborn Co., J. M. & L. A., Cleveland, O.  
 Parkersburg Iron & Steel Co., Parkersburg, W. Va.  
 • Payne Furnace & Supply Co., Beverly Hills, Cal.  
 • Peerless Foundry Co., Indianapolis, Ind.  
 Phillips Heating, Ventilating & Mfg. Co., Los Angeles, Cal.  
 Providence Cornice Co., Providence, R. I.  
 Reeves Steel & Mfg. Co., Dover, O.  
 Roberts-Hamilton Co., Minneapolis, Minn.  
 Schecter Brothers Co., Philadelphia, Pa.  
 Schoedinger Co., F. O., Columbus, O.  
 Standard Furnace & Supply Co., Omaha, Nebr.  
 Tiffin Art Metal Co., Tiffin, O.  
 • United States Register Co., Battle Creek, Mich.  
 Wheeling Corrugating Co., Wheeling, W. Va.  
 Wilder Manufacturing Company, Niles, O.  
 Williamson Heater Co., Cincinnati, O.

## PIPE, SMOKE

- Acer & Whedon, Inc., Medina, N. Y.  
 Acme Tin Plate & Roofing Supply Co., Philadelphia, Pa.  
 Alrtherm Mfg. Co., St. Louis, Mo.  
 Allegheny Steel Co., Brackenridge, Pa.  
 Berger Mfg. Co., Div. of Republic Steel Corp., Canton, O.  
 Braden Mfg. Co., Terre Haute, Ind.  
 Bros Boiler & Mfg. Co., Wm., Minneapolis, Minn.  
 Budke Stamping Co., Canonsburg, Pa.  
 Campbell Heating Co., Des Moines, Ia.  
 Chicago Metal Mfg. Co., Chicago, Ill.  
 Cincinnati Sheet Metal & Roofing Co., Cincinnati, O.  
 Cincinnati Stamping Co., Cincinnati, O.  
 Danzer Metal Works Co., Hagerstown, Md.  
 Detroit Safety Furnace Pipe Co., Detroit, Mich.  
 Edwards Furnace Co., Wellsboro, Pa.  
 Excelsior Steel Furnace Co., Chicago, Ill.  
 Excelsior Stove & Mfg. Co., Quincy, Ill.  
 Faultless Castings Co., Greencastle, Ind. (Cast Iron)  
 Galva Heater Co., Galva, Ill. (Cast Iron)  
 Green Foundry & Furnace Works, Des Moines, Ia.  
 • Henry Furnace & Foundry Co., Cleveland, O.  
 Home Furnace Co., Holland, Mich.  
 Howes Co., S. M., Charlestown, Boston, Mass.  
 International Heater Co., Utica, N. Y.  
 La Crosse Steel Roofing & Corrugating Co., La Crosse, Wis.  
 • Lamneck Products, Inc., Columbus, O.  
 Lennox Furnace Co., Marshalltown, Ia.  
 • Lyon, Conklin & Co., Inc., Baltimore, Md.  
 Majestic Co., Huntington, Ind.  
 Martin Bros., Rochester, N. Y.  
 Martin Metal Mfg. Co., Wichita, Kan.  
 • Meyer & Bro. Co., F., Peoria, Ill.  
 • Milcor Steel Co., Milwaukee, Wis.  
 • Mueller Furnace Co., L. J., Milwaukee, Wis.  
 Norman Sheet Metal Mfg. Co., W. F., Nevada, Mo.  
 • Osborn Co., J. M. & L. A., Cleveland, O.  
 Parkersburg Iron & Steel Co., Parkersburg, W. Va.  
 Patten Co., J. V., Sycamore, Ill.  
 • Peerless Foundry Co., Indianapolis, Ind.  
 Phillips Heating, Ventilating & Mfg. Co., Los Angeles, Cal.  
 Providence Cornice Co., Providence, R. I.  
 Puhl & Hepper Mfg. Co., Inc., St. Louis, Mo.  
 Reeves Steel & Mfg. Co., Dover, O.  
 Roberts-Hamilton Co., Minneapolis, Minn.

•Advertisement in this issue. See Index to Advertisers, page 192

- Rudy Furnace Co., Dowagiac, Mich.  
 Schecter Brothers Co., Philadelphia, Pa.  
 Schoedinger Co., F. O., Columbus, O.  
 Standard Furnace & Supply Co., Omaha, Nebr.  
 Sterling Foundry Co., Sterling, Ill. (Cast Iron)  
 Star-Na-Man Foundry Co., Springfield, Ill. (Cast Iron)  
 Tiffin Art Metal Co., Tiffin, O.  
 • United States Register Co., Battle Creek, Mich.  
 • Waterloo Register Co., Waterloo, Ia. (Cast Iron)  
 Wilder Manufacturing Company, Niles, O.  
 Williamson Heater Co., Cincinnati, O.  
 • Wise Furnace Co., Akron, O.

## PIPE, STOVE

- Acer & Whedon, Inc., Medina, N. Y.  
 Acme Tin Plate & Roofing Co., Philadelphia, Pa.  
 Budke Stamping Co., Canonsburg, Pa.  
 Chicago Metal Mfg. Co., Chicago, Ill.  
 Decatur Iron & Steel Co., Decatur, Ala.  
 Eclipse Metal Mfg. Co., Eden, N. Y.  
 Excelsior Steel Furnace Co., Chicago, Ill.  
 Excelsior Stove & Mfg. Co., Quincy, Ill.  
 Howes Co., S. M., Charlestown, Boston, Mass.  
 • Lyon, Conklin & Co., Inc., Baltimore, Md.  
 Martin Bros., Rochester, N. Y.  
 • Milcor Steel Co., Milwaukee, Wis.  
 • Osborn Co., J. M. & L. A., Cleveland, O.  
 • Peerless Foundry Co., Indianapolis, Ind.  
 Providence Cornice Co., Providence, R. I.  
 Reeves Steel & Mfg. Co., Dover, O.  
 Schecter Brothers Co., Philadelphia, Pa.  
 Schoedinger Co., F. O., Columbus, O.  
 Wheeling Corrugating Co., Wheeling, W. Va.  
 Wilder Manufacturing Company, Niles, O.

## PIPE, INSULATION

See *Insulation, Furnace and Pipe*

## PIPELESS FURNACES

See *Furnaces, Warm Air, Pipeless*

## PIPE AND FITTINGS, SHEET METAL

See *Ducts and Fittings, Prefabricated*

## PLATE, BEARING, STUDDING SPACE

Adjustable Bearing Plate Co., St. Louis, Mo.

## PLATES, ALLOY

- Allegheny Steel Co., Brackenridge, Pa.  
 Aluminum Company of America, Pittsburgh, Pa. (Aluminum)  
 • American Brass Co., Waterbury, Conn. (All copper alloys)  
 • American Rolling Mill Co., Middletown, O. (Stainless steel)  
 Bethlehem Steel Co., Bethlehem, Pa.  
 Crucible Steel Co. of America, New York City.  
 Gulf States Steel Co., Birmingham, Ala. (Copper, Steel)  
 Ingersoll Steel & Disc Div., Borg-Warner Corp., Chicago, Ill.  
 Lukens Steel Co., Coatesville, Pa.  
 • Republic Steel Corp., Cleveland, O. (Light gauge steel)  
 Revere Copper and Brass Incorporated, New York City.  
 • Ryerson & Son, Inc., Jos. T., Chicago, Ill.  
 • Youngstown Sheet & Tube Co., Youngstown, O.

## PLATES, STEEL

- American Rolling Mill Co., Middletown, O.  
 Bethlehem Steel Co., Bethlehem, Pa.  
 • Carnegie-Illinois Steel Co., Pittsburgh, Pa.  
 Crucible Steel Co. of America, New York City.  
 Decatur Iron & Steel Co., Decatur, Ala.  
 Granite City Steel Co., Granite City, Ill.  
 Gulf States Steel Co., Birmingham, Ala.  
 Ingersoll Steel & Disc Div., Borg-Warner Corp., Chicago, Ill.  
 Inland Steel Co., Chicago, Ill.  
 International Steel Co., Evansville, Ind.  
 Jones & Laughlin Steel Corp., Pittsburgh, Pa.  
 Koppers Co., Tar and Chemical Div., Pittsburgh, Pa.  
 Lukens Steel Co., Coatesville, Pa.  
 Otis Steel Co., Cleveland, O.  
 • Republic Steel Corp., Cleveland, O.  
 • Ryerson & Son, Inc., Jos. T., Chicago, Ill.  
 • United States Steel Corp., Pittsburgh, Pa.  
 Wood Steel Co., Alan, Conshohocken, Pa.  
 • Youngstown Sheet & Tube Co., Youngstown, O.

## PLATES, WROUGHT IRON

- Byers Co., A. M., Pittsburgh, Pa.  
 Reading Iron Co., Reading, Pa.



**PREFABRICATED DUCTS***See Ducts and Fittings, Prefabricated***PRESSES AND DIES**

- Bertsch & Co., Cambridge City, Ind.
- Bliss Co., E. W., Toledo, O.
- Callahan Can Machine Co., Inc., Brooklyn, N. Y.
- Cleveland Punch & Shear Works Co., Cleveland, O.
- Drels & Krump Mfg. Co., Chicago, Ill.
- Grand Rapids Die & Tool Co., Grand Rapids, Mich.
- Henry & Wright Mfg. Co., Hartford, Conn.
- Marshalltown Mfg. Co., Marshalltown, Ia.
- McGee-Parry Machine Wks., Salt Lake City, Utah.
- Minster Machine Co., Minster, O.
- New Albany Machine Mfg. Co., New Albany, Ind.
- Niagara Machine & Tool Works, Buffalo, N. Y.
- Precision Thermometer & Instrument Co., Philadelphia, Pa.
- Peck, Stow & Wilcox Co., Southington, Conn.
- Perkins Machine Co., Warren, Mass.
- Schatz Mfg. Co., Poughkeepsie, N. Y.
- Spun Steel Corp., Canton, O.
- Zeh & Hahnemann Co., Newark, N. J.

**PRESSURE REGULATING VALVES, GAS***See Valves, Gas Pressure Regulating***PROTECTORS, DOWNSPOUT***See Fittings and Accessories, Conductor***PSYCHROMETERS**

- Bristol Co., Waterbury, Conn.
- Brown Instrument Co., Div. Minneapolis-Honeywell Regulator Co., Philadelphia, Pa.
- Friez & Sons, Inc., Julien P., Baltimore, Md.
- G. M. Manufacturing Co., New York City.
- H-B Instrument Co., Inc., Philadelphia, Pa.
- Hill Co., Chicago, Ill.
- Moeller Instrument Co., Brooklyn, N. Y.
- Precision Thermometer & Instrument Co., Philadelphia, Pa.
- Tagliabue Mfg. Co., C. J., Brooklyn, N. Y.
- Taylor Instrument Companies, Rochester, N. Y.

**PULLEYS, FAN AND MOTOR**

- Allis-Chalmers Mfg. Co., Milwaukee, Wis.
- American Foundry & Furnace Co., Bloomington, Ill.
- American Pulley Co., Philadelphia, Pa.
- Browning Manufacturing Co., Inc., Ohio Valley Pulley Works, Division, Maysville, Ky.
- Chicago Die Casting Co., Chicago, Ill.
- Congress Tool & Die Co., Detroit, Mich.
- Dick Co., Inc., R. & J., Passaic, N. J.
- Dodge Mfg. Corp., Mishawaka, Ind.
- Duro Metal Products Co., Chicago, Ill.
- Goldens' Fdry. & Mach. Co., Columbus, Ga.
- Horton Mfg. Co., Minneapolis, Minn.
- Jones Fdry. & Mach. Co., W. A., Chicago, Ill.
- Lau Blower Co., Dayton, O.
- Maurey Mfg. Corp., Chicago, Ill.
- McGee-Parry Machine Wks., Salt Lake City, Utah.
- Medart Co., St. Louis, Mo.
- Moloch Fdry. & Mach. Co., Kaukauna, Wis.
- Pyott Fdry. & Mach. Co., Chicago, Ill.
- Reynolds Mfg. Co., Grand Rapids, Mich.
- Rockwood Mfg. Co., Indianapolis, Ind.
- Rosedale Fdry. & Mach. Co., N. S. Pittsburgh, Pa.
- Smith, Inc., Winfield H., Springfield, N. Y.
- Spun Steel Corp., Canton, O.
- Steel and Tubes, Inc., Cleveland, O. (Stamping)
- Swift Mfg. Co., Detroit, Mich.
- Wood's Sons Co., T. B., Chambersburg, Pa.

**PULLEYS, FURNACE**

- American Foundry & Furnace Co., Bloomington, Ill.
- Hart & Cooley Mfg. Co., Chicago, Ill.
- Mueller Furnace Co., L. J., Milwaukee, Wis.
- Rosedale Fdry. & Mach. Co., N. S., Pittsburgh, Pa.
- Stover Mfg. & Engine Co., Freeport, Ill.
- United States Register Co., Battle Creek, Mich.

**PUMPS, DEEP-WELL**

- American-Marsh Pumps, Inc., Battle Creek, Mich.
- Caldwell, Farley M., Fort Wayne, Ind.
- Chandler Co., Cedar Rapids, Ia.
- Crane Co., Chicago, Ill.
- Dayton Pump & Mfg. Co., Dayton, O.
- Decatur Pump Co., Decatur, Ill.
- Deming Co., Salem, O.
- Fairbanks, Morse & Co., Chicago, Ill.
- Goulds Pumps, Inc., Seneca Falls, N. Y.
- Hell Co., Milwaukee, Wis.

- Meier Electric & Machine Co., Indianapolis, Ind.
- Micro-Westco, Inc., Bettendorf, Ia.
- Myers & Bro. Co., F. E., Ashland, O.
- Pomona Pump Co., Pomona, Cal.
- Red Jacket Mfg. Co., Davenport, Ia.
- Roper Corp., Geo. D., Rockford, Ill.
- Union Steam Pump Co., Battle Creek, Mich.
- Uniflow Mfg. Co., Erie, Pa.
- United Motors Service, Detroit, Mich.
- Victor Equipment Co., Los Angeles, Cal.
- Worthington Pump & Machinery Corp., Harrison, N. J.

**PUMPS, SHALLOW-WELL**

- Chandler Co., Cedar Rapids, Ia.
- Crane Co., Chicago, Ill.
- Dayton Pump & Mfg. Co., Dayton, O.
- Decatur Pump Co., Decatur, Ill.
- Deming Co., Salem, O.
- Fairbanks, Morse & Co., Chicago, Ill.
- Goulds Pumps, Inc., Seneca Falls, N. Y.
- Hell Co., Milwaukee, Wis.
- Meier Electric & Machine Co., Indianapolis, Ind.
- Micro-Westco, Inc., Bettendorf, Ia.
- Morris Machine Works, Baldwinsville, N. Y.
- Myers & Bro. Co., F. E., Ashland, Ohio.
- Roots-Connersville Blower Corp., Connersville, Ind.
- Roper Corp., Geo. D., Rockford, Ill.
- Uniflow Mfg. Co., Erie, Pa.
- United Motors Service, Detroit, Mich.
- Victor Equipment Co., Los Angeles, Cal.
- Viking Pump Co., Cedar Falls, Ia.
- Worthington Pump & Machinery Corp., Harrison, N. J.

**PUMPS, WATER CIRCULATING**

- Aldrich Pump Co., Allentown, Pa.
- Allis-Chalmers Mfg. Co., Milwaukee, Wis.
- American-Marsh Pumps, Inc., Battle Creek, Mich.
- Bell & Gossett, Chicago, Ill.
- Buffalo Pumps, Inc., Buffalo, N. Y.
- Chicago Pump Co., Chicago, Ill.
- Decatur Pump Co., Decatur, Ill.
- Deming Co., Salem, O.
- De Laval Steam Turbine Co., Trenton, N. J.
- Economy Pumping Machinery Co., Inc., Chicago, Ill.
- Fairbanks, Morse & Co., Chicago, Ill.
- Frederick Iron & Steel Co., Frederick, Md.
- General Blower Co., Philadelphia, Pa.
- Goulds Pumps, Inc., Seneca Falls, N. Y.
- Ingersoll-Rand, New York City.
- Janette Mfg. Co., Chicago, Ill.
- Lecourtenay Co., Newark, N. J.
- Lewis & Co., Inc., Chas. S., St. Louis, Mo.
- Micro-Westco, Inc., Bettendorf, Ia.
- Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
- Morris Machine Works, Baldwinsville, N. Y.
- Myers & Bro. Co., F. E., Ashland, O.
- Nash Engineering Co., South Norwalk, Conn.
- National Steam Pump Co., Upper Sandusky, O.
- Palmer Electric Co., Detroit, Mich.
- Quimby Pump Co., Inc., Newark, N. J.
- Rock River Machine Co., Inc., Janesville, Wis.
- Roots-Connersville Blower Corp., Connersville, Ind.
- Roper Corp., Geo. D., Rockford, Ill.
- Schwitzer-Cummins Co., Indianapolis, Ind.
- Swaby Mfg. Co., Chicago, Ill.
- Taco Heaters, Inc., New York City.
- Trane Co., LaCrosse, Wis.
- Trimount Rotary Power Co., East Dedham, Mass.
- Uniflow Mfg. Co., Erie, Pa.
- Union Steam Pump Co., Battle Creek, Mich.
- Victor Equipment Co., Los Angeles, Cal.
- Viking Pump Co., Cedar Falls, Ia.
- Watts Regulator Co., Lawrence, Mass.
- Well Pump Co., Chicago, Ill.
- Weinman Pump Co., Columbus, O.
- Worthington Pump & Machinery Corp., Harrison, N. J.
- Yeomans Bros. Co., Chicago, Ill.

**PUNCHES AND SHEARS COMBINED**

- Allsteel Press Co., Inc., Chicago, Ill.
- Armstrong-Blum Mfg. Co., Chicago, Ill.
- Beatty Machine & Mfg. Co., Hammond, Ind.
- Bertsch & Co., Cambridge City, Ind.
- Buffalo Forge Co., Buffalo, N. Y.
- Cleveland Punch & Shear Works Co., Cleveland, O.
- Excelsior Tool & Machine Co., East St. Louis, Ill.
- G.D.S. Machinery & Supply Co., New York City.
- Heartley Machine & Tool Co., Toledo, O.
- Hendley & Whittemore Co., Beloit, Wis.
- Kidder Mfg. Co., Inc., J. F., Burlington, Vt.
- Niagara Machine & Tool Works, Buffalo, N. Y.
- Peck, Stow & Wilcox Co., Southington, Conn.
- Pels & Co., Inc., Henry, New York City.
- Rock River Machine Co., Inc., Janesville, Wis.
- Schatz Mfg. Co., Poughkeepsie, N. Y.



**PUNCHES, BENCH**

- Allsteel Press Co., Inc., Chicago, Ill.
- Armstrong-Blum Mfg. Co., Chicago, Ill.
- Buffalo Forge Co., Buffalo, N. Y.
- Champion Blower & Forge Co., Lancaster, Pa.
- Clough, A. W., Meriden, Conn.
- Excelsior Tool and Machine Co., East St. Louis, Ill.
- Heartley Machine & Tool Co., Toledo, O.
- Hendley & Whittemore Co., Beloit, Wis.
- Kidder Mfg. Co., Inc., J. F., Burlington, Vt.
- New Albany Machine Mfg. Co., New Albany, Ind.
- Niagara Machine & Tool Works, Buffalo, N. Y.
- Peck, Stow & Wilcox Co., Southington, Conn.
- Rock River Machine Co., Inc., Janesville, Wis.
- Schatz Mfg. Co., Poughkeepsie, N. Y.
- Whitney Mfg. Co., W. A., Rockford, Ill.
- Whitney Metal Tool Co., Rockford, Ill.

**PUNCHES, COMBINATION HAND AND BENCH**

- Allsteel Press Co., Inc., Chicago, Ill.
- Armstrong-Blum Mfg. Co., Chicago, Ill.
- Champion Blower & Forge Co., Lancaster, Pa.
- Heartley Machine & Tool Co., Toledo, O.
- Hendley & Whittemore Co., Beloit, Wis.
- Niagara Machine & Tool Works, Buffalo, N. Y.
- Peck, Stow & Wilcox Co., Southington, Conn.
- Perkins Machine Co., Warren, Mass.
- Rock River Machine Co., Inc., Janesville, Wis.
- Schatz Mfg. Co., Poughkeepsie, N. Y.
- Whitney Mfg. Co., W. A., Rockford, Ill.
- Whitney Metal Tool Co., Rockford, Ill.

**PUNCHES, HAND**

- Allsteel Press Co., Inc., Chicago, Ill.
- Armstrong-Blum Mfg. Co., Chicago, Ill.
- Bertsch & Co., Cambridge City, Ind.
- Bollaert, M., Oakland, Cal.
- Buffalo Forge Co., Buffalo, N. Y.
- Champion Blower & Forge Co., Lancaster, Pa.
- Cleveland Punch & Shear Works Co., Cleveland, O.
- Clough, A. W., Meriden, Conn.
- Heartley Machine & Tool Co., Toledo, O.
- Hendley & Whittemore Co., Beloit, Wis.
- Johnson, Inc., William, Newark, N. J.
- Kidder Mfg. Co., Inc., J. F., Burlington, Vt.
- Niagara Machine & Tool Works, Buffalo, N. Y.
- Parker-Kalon Corp., New York City.
- Peck, Stow & Wilcox Co., Southington, Conn.
- Pels & Co., Inc., Henry, New York City.
- Rock River Machine Co., Inc., Janesville, Wis.
- Schatz Mfg. Co., Poughkeepsie, N. Y.
- Service Machine Co., Elizabeth, N. J.
- Whitney Mfg. Co., W. A., Rockford, Ill.
- Whitney Metal Tool Co., Rockford, Ill.

**PUNCHES, POWER**

- Allsteel Press Co., Inc., Chicago, Ill.
- Beatty Machine & Mfg. Co., Hammond, Ind.
- Bertsch & Co., Cambridge City, Ind.
- Bliss Co., E. W., Toledo, O.
- Buffalo Forge Co., Buffalo, N. Y.
- Callahan Can Machine Co., Inc., Brooklyn, N. Y.
- Cleveland Punch & Shear Works Co., Cleveland, O.
- Excelsior Tool and Machine Co., East St. Louis, Ill.
- Heartley Machine & Tool Co., Toledo, O.
- Hendley & Whittemore Co., Beloit, Wis.
- Henry & Wright Mfg. Co., Hartford, Conn.
- New Albany Machine Mfg. Co., New Albany, Ind.
- Niagara Machine & Tool Works, Buffalo, N. Y.
- Peck, Stow & Wilcox Co., Southington, Conn.
- Pels & Co., Inc., Henry, New York City.
- Perkins Machine Co., Warren, Mass.
- Rock River Machine Co., Inc., Janesville, Wis.
- Schatz Mfg. Co., Poughkeepsie, N. Y.
- Service Machine Co., Elizabeth, N. J.
- Swaine Mfg. Co., Fred J., St. Louis, Mo.
- Whitney Metal Tool Co., Rockford, Ill.
- Zeh & Hahnemann Co., Newark, N. J.

**QUADRANTS, DAMPER**

- American Foundry & Furnace Co., Bloomington, Ill.
- California Cornice, Steel and Supply Corp., Los Angeles, Cal.
- Goese Mfg. Co., Milwaukee, Wis.
- Hart & Cooley Mfg. Co., Chicago, Ill.
- Jamar Co., Walker, Duluth, Minn.
- Littleford Bros., Cincinnati, O.
- Northern Weatherstrip Co., Duluth, Minn.
- Ohio Products Co., Cleveland, O.
- Parker-Kalon Corp., New York City.
- Schoedinger Co., F. O., Columbus, O.
- Young Regulator Co., Cleveland, O.

**REBUILT MACHINERY**

*See Machinery, Rebuilt and Used*

**RECORDERS, HUMIDITY**

- Bristol Co., Waterbury, Conn.
- Brown Instrument Co., Div. of Minneapolis-Honeywell Reg. Co., Philadelphia, Pa.
- Friez & Sons, Inc., Julien P., Baltimore, Md.
- G. M. Manufacturing Co., New York City.
- H-B Instrument Co., Inc., Philadelphia, Pa.
- Leeds & Northrup Co., Philadelphia, Pa.
- Tagliabue Mfg. Co., C. J., Brooklyn, N. Y.
- Taylor Instrument Companies, Rochester, N. Y.

**RECORDERS, TEMPERATURE**

- Bristol Co., Waterbury, Conn.
- Brown Instrument Co., Div. of Minneapolis-Honeywell Reg. Co., Philadelphia, Pa.
- Friez & Sons, Inc., Julien P., Baltimore, Md.
- G. M. Manufacturing Co., New York City.
- H-B Instrument Co., Inc., Philadelphia, Pa.
- Leeds & Northrup Co., Philadelphia, Pa.
- Manning, Maxwell & Moore, Inc., Bridgeport, Conn.
- Practical Instrument Co., Chicago, Ill.
- Preferred Utilities Mfg. Corp., New York City.
- Tagliabue Mfg. Co., C. J., Brooklyn, N. Y.
- Taylor Instrument Companies, Rochester, N. Y.

**REFRACTORIES**

- Chapman Clay Co., Zanesville, O.
- Chicago Fire Brick Co., Chicago, Ill.
- Cleveland Fire Brick Co., Cleveland, O.
- Fireline Stove & Furnace Lining Co., Chicago, Ill. (Plastic firepot lining)
- Johns-Manville, New York City. (Cement and monolithic)
- Keasbey & Mattison Co., Ambler, Pa.
- Laclede-Christy Clay Products Co., St. Louis, Mo. (Fire brick and high temperature mortars)
- Preferred Utilities Mfg. Corp., New York City.
- Pyrolite Products Co., Cleveland, O.
- Rex Clay Products Co., Detroit, Mich.
- Schundler & Co., Inc., F. E., Long Island City, N. Y.
- Standard Fuel Engineering Co., Detroit, Mich.
- Walsh Refractories Corp., St. Louis, Mo.

**REGISTER SHIELDS**

*See Shields, Warm Air Register*

**REFRIGERATING UNITS**

*See Compressors, Refrigerating*

**REGISTERS, DIRECTIONAL FLOW**

- Anemostat Corporation of America, New York City. (High Velocity Air Diffusers)
- Auer Register Co., Cleveland, O.
- Barber-Colman Co., Rockford, Ill.
- Eckenroth Register Co., San Francisco, Cal.
- Elsey Metal Specialties Co., Detroit, Mich.
- Gillian Mfg. Co., Ferndale, Mich.
- Hart & Cooley Mfg. Co., Chicago, Ill.
- Hendrick Mfg. Co., Carbondale, Pa.
- Independent Register Co., Cleveland, O.
- National Fan & Blower Corp., Chicago, Ill.
- Register & Grille Mfg. Co., Brooklyn, N. Y.
- Tuttle & Bailey, Inc., New Britain, Conn.
- United States Register Co., Battle Creek, Mich.
- Waterloo Register Co., Waterloo, Ia.

**REGISTERS, HEATING AND VENTILATING**

- American Foundry & Furnace Co., Bloomington, Ill.
- Anemostat Corporation of America, New York City. (High Velocity Air Diffusers)
- Auer Register Co., Cleveland, O.
- Barber-Colman Co., Rockford, Ill.
- Bergstrom Mfg. Co., Neenah, Wis.
- Best Register Co., Milwaukee, Wis.
- Diamond Mfg. Co., Wyoming, Pa.
- Eckenroth Register Co., San Francisco, Cal.
- Forest City Foundries Co., Cleveland, O.
- Gillian Mfg. Co., Ferndale, Mich.
- Hart & Cooley Mfg. Co., Chicago, Ill.
- Hendrick Mfg. Co., Carbondale, Pa.
- Independent Register Co., Cleveland, O.
- Lamneck Products, Inc., Columbus, O.
- Liberty Foundry Co., St. Louis, Mo.
- Maysteel Products, Inc., Mayville, Wis.
- Mueller Furnace Co., L. J., Milwaukee, Wis.
- Newman Brothers, Inc., Cincinnati, O.
- Pacific Gas Radiator Co., Los Angeles, Cal.
- Register & Grille Mfg. Co., Inc., Brooklyn, N. Y.
- Roberts-Hamilton Co., Minneapolis, Minn.
- Rock Island Register Co., Rock Island, Ill.
- Springman Metal Specialty Co., Detroit, Mich.
- Standard Stamping & Perforating Co., Chicago, Ill.
- Tuttle & Bailey, Inc., New Britain, Conn.
- United States Register Co., Battle Creek, Mich.
- Waterloo Register Co., Waterloo, Ia.

## REGULATORS, DRAFT, SMOKE PIPE

- Anderson Products, Inc., Cambridge, Mass.  
 Bristol Co., Waterbury, Conn.  
 Cole Draft Governor Sales Co., Chicago, Ill.  
 Cole-Sullivan Engineering Co., Minneapolis, Minn.  
 Dutcher Heating Co., Canton, Mass.  
 Field Mfg. Co., Chicago, Ill.  
 Gold Seal Furnace Co., Minneapolis, Minn. (Automatic)  
 Harvey-Whipple, Inc., Springfield, Mass.  
 Hotentot Co., Inc., Omaha, Nebr.  
 Hotstream Heater Co., Cleveland, O. (Automatic)  
 James Regulator Co., Inc., Pottsville, Pa.  
 • Parker-Kalon Corp., New York City. (Dial Damper).  
 Platt Products Corp., Lansing, Mich. (6 and 9-inch)  
 Polk Mfg. Co., Madison, Wis.  
 Preferred Utilities Mfg. Corp., New York City.  
 Simplex Mfg. Co., Fond du Lac, Wis.  
 Walker Mfg. & Sales Corp., St. Joseph, Mo.

## REGULATORS, FURNACE DRAFT, MECHANICAL

- Air Conditioning Supply Co., Cleveland, O.  
 • Automatic Humidifier Co., Cedar Falls, Ia.  
 • Automatic Products Co., Milwaukee, Wis.  
 • Barber-Colman Co., Rockford, Ill.  
 Cole-Sullivan Engineering Co., Minneapolis, Minn.  
 Dutcher Heating Co., Canton, Mass.  
 • Gleason-Avery, Inc., Auburn, N. Y.  
 Gold Seal Furnace Co., Minneapolis, Minn.  
 • Hart & Cooley Mfg. Co., Chicago, Ill.  
 Hays Corp., Michigan City, Ind.  
 Mercoid Corp., Chicago, Ill.  
 Minneapolis Automatic Draft Regulator Co., Minneapolis, Minn.  
 • Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.  
 Safe Automatic Heat Control Co., Detroit, Mich.  
 Tillery's Little Janitor Clock Co., Newark, N. J.  
 Uni-Therm, Inc., Elyria, O.

## RELAYS, ELECTRICAL

- Allen-Bradley Co., Milwaukee, Wis.  
 Automatic Switch Co., New York City.  
 Bender Warrick Corp., Birmingham, Mich.  
 Benjamin Elec. Mfg. Co., Des Plaines, Ill.  
 Clark Controller Co., Cleveland, O.  
 • Cook Electric Co., Chicago, Ill.  
 Cutler-Hammer, Inc., Milwaukee, Wis.  
 Detroit Lubricator Co., Detroit, Mich.  
 Dunn, Inc., Struthers, Philadelphia, Pa.  
 Electric Controller & Mfg. Co., Cleveland, O.  
 Friez & Sons, Inc., Jullien P., Baltimore, Md.  
 General Controls Co., San Francisco, Cal., and Cleveland, O.  
 • General Electric Co., Schenectady, N. Y.  
 • Gleason-Avery, Inc., Auburn, N. Y.  
 Guardian Electric Mfg. Co., Chicago, Ill.  
 H-B Instrument Co., Inc., Philadelphia, Pa.  
 Hart Mfg. Co., Hartford, Conn.  
 Industrial Engineering Corp., Evansville, Ind.  
 McCorkle Co., D. H., Berkeley, Calif.  
 Mercoid Corp., Chicago, Ill.  
 Micro Switch Corp., Freeport, Ill.  
 • Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.  
 Monitor Controller Co., Baltimore, Md.  
 Penn Electric Switch Co., Goshen, Ind.  
 Perfex Corp., Milwaukee, Wis.  
 Precision Thermometer & Instrument Co., Philadelphia, Pa.  
 Sheer Co., H. M., Quincy, Ill.  
 Taylor Instrument Companies, Rochester, N. Y.  
 Ward Leonard Electric Co., Mt. Vernon, N. Y.  
 Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.  
 Weston Electrical Instrument Corp., Newark, N. J.

## REPAIRS, STOVE AND FURNACE

- Adams Co., Dubuque, Ia.  
 Associated Heater Parts Co., Chicago, Ill.  
 Banner Repair Parts Co., Youngstown, O.  
 Bardes Range & Foundry Co., E. H., Cincinnati, O.  
 • Brauer Supply Co., A. G., St. Louis, Mo.  
 • Capitol Furnace & Stove Repair Co., Indianapolis, Ind.  
 • Central Furnace & Stove Repair Co., St. Louis, Mo.  
 Cincinnati Stamping Co., Cincinnati, O.  
 Des Moines Stove Repair Co., Des Moines, Ia.  
 Detroit Michigan Stove Co., Detroit, Mich.  
 Edwards Furnace Co., Wellsboro, Pa.  
 Faultless Heater Corp., Cleveland, O.  
 Forest City Foundries Co., Cleveland, O.  
 • Henry Furnace & Foundry Co., Cleveland, O.  
 Keith Furnace Co., Des Moines, Ia.  
 Marshall Furnace Co., Marshall, Mich.  
 Metzner Stove Repair Co., Kansas City, Mo.  
 Miller & Son, C. Arthur, Elmira, N. Y. (Furnace)  
 Mt. Vernon Furnace & Mfg. Co., Mt. Vernon, Ill.  
 National Foundry & Furnace Co., Dayton, O.  
 • Northwestern Stove Repair Co., Chicago, Ill.  
 • Peerless Foundry Co., Indianapolis, Ind.  
 • Peninsular Stove Co., Detroit, Mich.  
 Pittsburgh Furnace Parts Co., Pittsburgh, Pa.

- Round Oak Co., Dowagiac, Mich.  
 Security Stove & Mfg. Co., Kansas City, Mo.  
 Shamblen Furnace Parts Co., Pittsburgh, Pa.  
 • Standard Foundry & Furnace Co., De Kalb, Ill.  
 Stiglitz Furnace & Foundry Co., Louisville, Ky.  
 Wayne Pattern & Foundry Co., Fort Wayne, Ind.  
 Williamson Heater Co., Cincinnati, O.

## RIDGE ROLLS AND RIDGING

- Ames Co., W. R., San Francisco, Cal.  
 Barnes Metal Products Co., Chicago, Ill.  
 • Berger Bros. Co., Philadelphia, Pa.  
 Berger Mfg. Co., Div. of Republic Steel Corp., Canton, O.  
 Chase Brass & Copper Co., Inc., Waterbury, Conn.  
 Cincinnati Sheet Metal & Roofing Co., Cincinnati, O.  
 Danzer Metal Works Co., Hagerstown, Md.  
 Decatur Iron & Steel Co., Decatur, Ala.  
 Downs-Smith Brass & Copper Co., New York City.  
 Edwards Mfg. Co., Inc., Cincinnati, O.  
 Gulf States Steel Co., Birmingham, Ala.  
 • Hussey & Co., C. G., Pittsburgh, Pa. (Copper)  
 Inland Steel Co., Chicago, Ill.  
 Klauer Mfg. Co., Dubuque, Ia.  
 La Crosse Steel Roofing & Corrugating Co., La Crosse, Wis.  
 Lamb & Ritchie Co., Cambridge, Mass.  
 • Lyon, Conklin & Co., Inc., Baltimore, Md.  
 Martin Metal Mfg. Co., Wichita, Kan.  
 • Meyer & Bro. Co., F., Peoria, Ill.  
 • Milcor Steel Co., Milwaukee, Wis.  
 New Delphos Mfg. Co., Delphos, O.  
 Norman Sheet Metal Mfg. Co., W. F., Nevada, Mo.  
 • Osborn Co., J. M., & L. A., Cleveland, O.  
 Providence Cornice Co., Providence, R. I.  
 Reeves Steel & Mfg. Co., Dover, O.  
 • Republic Steel Corp., Cleveland, O.  
 Rynker Sheet Metal Works, Inc., Billings, Mont.  
 Schoedinger Co., F. O., Columbus, O.  
 Southbridge Roofing Co., Inc., Southbridge, Mass.  
 Southern States Iron Roofing Co., Savannah, Ga.  
 Tiffin Art Metal Co., Tiffin, O.  
 Van Noorden Co., E., Boston, Mass.  
 Wheeling Corrugating Co., Wheeling, W. Va.  
 Willis Mfg. Co., Galesburg, Ill.  
 Woolwine Metal Products Co., Los Angeles, Cal.  
 • Youngstown Sheet & Tube Co., Youngstown, O.

## RINGS, HANGER, BLOW PIPE

See Fittings, Blow Pipe

## RIVETS, ALLOY

- Allegheny Steel Co., Brackenridge, Pa. (Stainless)  
 Bethlehem Steel Co., Bethlehem, Pa.  
 Clark Bros. Bolt Co., Milldale, Conn.  
 Duriron Co., Inc., Dayton, O. (Steel, chromium-nickel)  
 • Republic Steel Corp., Cleveland, O. (Stainless steel and steel)  
 Townsend Co., New Brighton, Pa.

## RIVETS, ALUMINUM

- Aluminum Company of America, Pittsburgh, Pa.  
 Bridgeport Screw Co., Bridgeport, Conn.  
 Chicago Rivet & Mach. Co., Cicero, Ill.  
 Continental Screw Co., New Bedford, Mass.  
 Hassall, Inc., John, Brooklyn, N. Y.  
 Townsend Co., New Brighton, Pa.

## RIVETS, BRASS, COPPER AND IRON

- Abbott Mfg. Co., Painesville, O.  
 Atlas Bolt & Screw Co., Cleveland, O.  
 Bethlehem Steel Co., Bethlehem, Pa.  
 Bridgeport Screw Co., Bridgeport, Conn.  
 Chase Brass & Copper Co., Inc., Waterbury, Conn.  
 Chicago Rivet & Mach. Co., Cicero, Ill.  
 Continental Screw Co., New Bedford, Mass.  
 Hassall, Inc., John, Brooklyn, N. Y.  
 • Hussey & Co., C. G., Pittsburgh, Pa.  
 Inland Steel Co., Chicago, Ill.  
 National Screw & Mfg. Co., Cleveland, O.  
 Revere Copper and Brass Incorporated, New York City.  
 (Brass and Copper)  
 Townsend Co., New Brighton, Pa.

## ROD, WELDING

- Air Reduction Sales Co., New York City.  
 Aluminum Company of America, Pittsburgh, Pa. (Aluminum)  
 • American Brass Co., Waterbury, Conn.  
 American Chain Co., Inc., Bridgeport, Conn.  
 American Steel Co., Pittsburgh, Pa.  
 American Steel & Wire Co., Chicago, Ill.  
 Bridgeport Brass Co., Bridgeport, Conn.  
 Central Steel & Wire Co., Chicago, Ill.  
 Chase Brass & Copper Co., Inc., Waterbury, Conn.  
 Chicago Steel & Wire Co., Chicago, Ill.



- Consolidated Screw Co., New Bedford, Mass.  
 Crucible Steel Co. of America, New York City.  
 Handy & Harmon, New York City.  
 Imperial Brass Mfg. Co., Chicago, Ill.  
 • International Nickel Co., Inc., New York City. (Monel)  
 Lee & Son Co., K. O., Aberdeen, S. D.  
 Linde Air Products Co., New York City.  
 Maurath, Inc., Cleveland, O.  
 Milburn Co., Alexander, Baltimore, Md.  
 Page Steel & Wire Co., Monessen, Pa. (Stainless Steel)  
 Revere Copper and Brass Incorporated, New York City.  
 Slight Feed Generator Co., Richmond, Ind.  
 Torchweld Equipment Co., Chicago, Ill.  
 Una Welding, Inc., Cleveland, O.  
 Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.  
 Wickwire Spencer Steel Co., New York City.  
 • Youngstown Sheet & Tube Co., Youngstown, O.

## ROLLS (HAND AND POWER), FORMING, BENDING

- Bertsch & Co., Cambridge City, Ind.  
 Hendley & Whittemore Co., Beloit, Wis.  
 • Maplewood Machinery Co., Inc., Chicago, Ill.  
 • Niagara Machine & Tool Works, Buffalo, N. Y.  
 • Peck, Stow & Wilcox Co., Southington, Conn.  
 Schatz Mfg. Co., Poughkeepsie, N. Y.

## ROOFING, ALUMINUM

- Biersach & Niedermeyer Co., Milwaukee, Wis.  
 Fingles, Inc., W. A. Baltimore, Md.  
 Southern States Iron Rfg. Co., Savannah, Ga.

## ROOFING, BUILT-UP

- American Brass Co., Waterbury, Conn.  
 Barber Co., Inc., Philadelphia, Pa.  
 Barrett Co., New York City.  
 Bird & Son, Inc., East Walpole, Mass.  
 Cabot, Inc., Samuel, Boston, Mass.  
 Carey Co., Philip, Lockland, Cincinnati, O.  
 Certain-teed Products Corp., New York City.  
 Flintkote Co., New York City.  
 Johns-Manville, New York City.  
 Koppers Co., Tar and Chemical Div., Pittsburgh, Pa. (Pitch and Felt)  
 Logan-Long Co., Chicago, Ill.  
 National Mfg. Corp., Tonawanda, N. Y.  
 Reilly Tar & Chemical Co., Indianapolis, Ind.  
 Ruberoid Co., New York City.  
 United States Gypsum Co., Chicago, Ill.

## ROOFING, COPPER

- American Brass Co., Waterbury, Conn.  
 Braden Mfg. Co., Terre Haute, Ind.  
 Bridgeport Brass Co., Bridgeport, Conn.  
 Chase Brass & Copper Co., Inc., Waterbury, Conn.  
 Danzer Metal Works Co., Hagerstown, Md.  
 Downs-Smith Brass & Copper Co., New York City.  
 Edwards Mfg. Co., Inc., Cincinnati, O. (Metal Shingles, Spanish Tile)  
 Fingles, Inc., W. A. Baltimore, Md.  
 Hermann & Grace Co., Brooklyn, N. Y.  
 • Hussey & Co., C. G., Pittsburgh, Pa.  
 • Meyer & Bro. Co., F., Peoria, Ill.  
 • Milcor Steel Co., Milwaukee, Wis.  
 National Brass & Copper Co., Inc., Pittsburgh, Pa.  
 New Haven Copper Co., Seymour, Conn.  
 Revere Copper and Brass Incorporated, New York City.  
 Southern States Iron Roofing Co., Savannah, Ga.  
 Tiffin Art Metal Co., Tiffin, O.  
 Wheeling Metal & Mfg. Co., Wheeling, W. Va.

## ROOFING, IRON AND STEEL

- Allegheny Steel Co., Brackenridge, Pa. (Stainless)  
 • American Rolling Mill Co., Middletown, O.  
 Ames Co., W. R., San Francisco, Cal.  
 Apollo Steel Co., Apollo, Pa.  
 Beatrice Steel Tank Mfg. Co., Beatrice, Nebr.  
 Berger Mfg. Co., Div. of Republic Steel Corp., Canton, O.  
 Bethlehem Steel Co., Bethlehem, Pa.  
 Biersach & Niedermeyer Co., Milwaukee, Wis.  
 Braden Mfg. Co., Terre Haute, Ind.  
 Budke Stamping Co., Canonsburg, Pa.  
 Byers Co., A. M., Pittsburgh, Pa. (Wrought Iron)  
 • Carnegie-Illinois Steel Co., Pittsburgh, Pa.  
 Cincinnati Sheet Metal & Roofing Co., Cincinnati, O.  
 Columbia Steel Co., San Francisco, Cal. (Steel)  
 Danzer Metal Works Co., Hagerstown, Md.  
 Edwards Mfg. Co., Inc., Cincinnati, O.  
 Fingles, Inc., W. A. Baltimore, Md.  
 Globe Iron Roofing & Corrugating Co., Cincinnati, O.  
 Gulf States Steel Co., Birmingham, Ala.  
 Inland Steel Co., Chicago, Ill. (Steel)  
 Jones & Laughlin Steel Corp., Pittsburgh, Pa.

- Klauer Mfg. Co., Dubuque, Ia.  
 Kor-Lok Company, Cleveland, O.  
 La Crosse Steel Roofing & Corrugating Co., La Crosse, Wis.  
 • Lyon, Conklin & Co., Inc., Baltimore, Md.  
 Martin Metal Mfg. Co., Wichita, Kan.  
 • Meyer & Bro. Co., F., Peoria, Ill.  
 • Milcor Steel Co., Milwaukee, Wis.  
 New Delphos Mfg. Co., Delphos, O.  
 Newport Rolling Mill Co., Newport, Ky.  
 Niles Rolling Mill Co., Niles, O.  
 Parkersburg Iron & Steel Co., Parkersburg, W. Va.  
 Reeves Steel & Mfg. Co., Dover, O.  
 • Republic Steel Corp., Cleveland, O.  
 Robertson Co., H. H., Pittsburgh, Pa.  
 St. Paul Corrugating Co., St. Paul, Minn.  
 Southbridge Roofing Co., Inc., Southbridge, Mass.  
 Southern States Iron Rfg. Co., Savannah, Ga.  
 Tennessee Coal, Iron & Railroad Co., Birmingham, Ala. (Steel)  
 Tiffin Art Metal Co., Tiffin, O.  
 Truscon Steel Co., Youngstown, O.  
 • United States Steel Corp., Pittsburgh, Pa.  
 Van Noorden Co., E., Boston, Mass.  
 Wheeling Corrugating Co., Wheeling, W. Va.  
 Wheeling Metal & Mfg. Co., Wheeling, W. Va.  
 Wheeling Steel Corp., Wheeling, W. Va.  
 York Corrugating Co., York, Pa.  
 • Youngstown Sheet & Tube Co., Youngstown, O.

## ROOFING, LEAD

- Biersach & Niedermeyer Co., Milwaukee, Wis.  
 Downs-Smith Brass & Copper Co., New York City.  
 Fingles, Inc., W. A. Baltimore, Md.  
 National Lead Co., New York City.  
 Rochester Lead Works, Rochester, N. Y.  
 Southbridge Roofing Co., Inc., Southbridge, Mass.

## ROOFING PAINT

See Paint, Roofing

## ROOFING, SLATE

- Bangor-Washington Slate Co., Bangor, Pa.  
 Chapman Slate Co., Bethlehem, Pa.  
 Jackson-Bangor Slate Co., Pen Argyl, Pa.  
 North Bangor Slate Co., Bangor, Pa.  
 Rising & Nelson Slate Co., West Pawlet, Vt.  
 Sheldon Slate Co., F. C., Granville, N. Y.  
 Structural Slate Co., Pen Argyl, Pa.  
 Vendor Slate Co., Inc., Nazareth, Pa.  
 Vermont Structural Slate Co., Fair Haven, Vt.

## ROOFING, TILE (CLAY & CONCRETE)

- Hood Co., B. Mifflin, Daisy, Tenn. (Clay).  
 Ludowici-Celadon Co., Chicago, Ill.  
 • Lyon, Conklin & Co., Inc., Baltimore, Md.  
 Murray Tile Co., Cloverport, Ky.

## ROOFING, TIN

- Berger Mfg. Co., Div. of Republic Steel Corp., Canton, O.  
 Biersach & Niedermeyer Co., Milwaukee, Wis.  
 • Carnegie-Illinois Steel Co., Pittsburgh, Pa.  
 Follansbee Bros. Co., Pittsburgh, Pa.  
 • Milcor Steel Co., Milwaukee, Wis.  
 Southbridge Roofing Co., Inc., Southbridge, Mass.  
 Southern States Iron Rfg. Co., Savannah, Ga.  
 Taylor Co., N. & G., Div. Republic Steel Co., Cumberland Md.  
 • United States Steel Corp., Pittsburgh, Pa.  
 Wheeling Corrugating Co., Wheeling, W. Va.  
 Wheeling Steel Corp., Wheeling, W. Va.

## ROOFING, ZINC

- American Zinc Products Co., Greencastle, Ind.  
 Barnes Metal Products Co., Chicago, Ill.  
 Illinois Zinc Co., Peru, Ill.  
 Matthiessen & Hegeler Zinc Co., La Salle, Ill.  
 Southern States Iron Rfg. Co., Savannah, Ga.  
 Van Noorden Co., E., Boston, Mass.  
 Wheeling Corrugating Co., Wheeling, W. Va. (Coated)  
 Wheeling Steel Corp., Wheeling, W. Va. (Coated)

## SAVERS, HEAT

- Bedard Mfg. Co., Minneapolis, Minn. (Smoke Pipe)  
 Cary Mfg. Co., Waupaca, Wis.  
 Chinook, Inc., St. Paul, Minn.  
 • Condensation Engineering Corp., Chicago, Ill.  
 Crown Fuel Saver Co., Richmond, Ind.  
 Gerhardt, W. F., Richmond, Va.



Harvey-Whipple, Inc., Springfield, Mass.  
 LaCrosse Tractor Co., LaCrosse, Wis.  
 Meyers Fuel Saver Co., Inc., Janesville, Wis.  
 Roberts-Hamilton Co., Minneapolis, Minn.  
 Wolff Coal Saver Co., Chicago, Ill.  
 Woolery Machine Co., Minneapolis, Minn.

### SAWS, BAND, SHEET METAL CUTTING

Continental Machine Specialties, Inc., 1301 Washington Ave.,  
 South, Minneapolis, Minn. (Rotary)  
 Robertson Machine & Fdry Co., Buffalo, N. Y.  
 Tannewitz Works, Grand Rapids, Mich.  
 Wells Mfg. Corp., Three Rivers, Mich.

### SCREWS, DRIVE

American Screw Co., Providence, R. I.  
 Anti-Corrosive Metal Products Co., Inc., Castleton-on-Hud-  
 son, N. Y. (Stainless Steel)  
 Continental Screw Co., New Bedford, Mass.  
 Corbin Screw Corp., New Britain, Conn.  
 Deniston Co., Chicago, Ill.  
 Hassall, Inc., John, Brooklyn, N. Y.  
 National Screw & Mfg. Co., Cleveland, O.  
 ● Parker-Kalon Corp., New York City (Hardened Metallic)  
 Turner & Seymour Mfg. Co., Torrington, Conn.

### SCREWS, SELF-TAPPING

Continental Screw Co., New Bedford, Mass.  
 National Screw & Mfg. Co., Cleveland, O.  
 ● Parker-Kalon Corp., New York City.  
 Shakeproof Lock Washer Co., Chicago, Ill.

### SCREWS, SHEET METAL

Allegheny Steel Co., Brackenridge Pa. (Stainless)  
 Aluminum Co. of America, Pittsburgh, Pa. (Aluminum)  
 American Screw Co., Providence, R. I.  
 Anti-Corrosive Metal Products Co., Inc., Castleton-on-Hud-  
 son, N. Y. (Stainless Steel)  
 Continental Screw Co., New Bedford, Mass.  
 Hassall, Inc., John, Brooklyn, N. Y.  
 National Screw & Mfg. Co., Cleveland, O.  
 ● Parker-Kalon Corp., New York City.

### SHALLOW WELL PUMPS

*See Pumps, Shallow Well*

### SHAPES, STRUCTURAL

*See Angles, Bars, Beams, Channels and Tees (Structural Shapes)*

### SHEARS, HAND AND BENCH

*See Snips and Shears, Bench and Hand*

### SHEARS AND PUNCHES COMBINED

*See Punches and Shears Combined*

### SHEARS, PORTABLE, ELECTRIC

G. D. S. Machinery & Supply Co., New York City  
 Glascock Bros. Mfg. Co., Muncie, Ind.  
 ● Skilsaw, Inc., Chicago, Ill.  
 Stanley Electric Tool Div., The Stanley Works, New Britain,  
 Conn.

### SHEARS, POWER

Allsteel Press Co., Inc., Chicago, Ill.  
 Beatty Machine & Mfg. Co., Hammond, Ind.  
 Bertsch & Co., Cambridge City, Ind.  
 Bliss Co., E. W., Toledo, O.  
 ● Buffalo Forge Co., Buffalo, N. Y.  
 Cincinnati Shaper Co., Cincinnati, O.  
 Cleveland Punch & Shear Works Co., Cleveland, O.  
 ● Dreis & Krump Mfg. Co., Chicago, Ill.  
 Excelsior Tool and Machine Co., East St. Louis, Ill.  
 Heartley Machine & Tool Co., Toledo, O.  
 Hendley & Whittemore Co., Beloit, Wis.  
 ● Libert Machine Co., Green Bay, Wis. (Rapid Cutting)  
 ● Marshalltown Mfg. Co., Marshalltown, Ia.  
 New Albany Machine Mfg. Co., New Albany, Ind.  
 ● Niagara Machine & Tool Works, Buffalo, N. Y.  
 ● Peck, Stow & Wilcox Co., Southington, Conn.  
 Pels & Co., Inc., Henry, New York City  
 Quickwork Co., St. Marys, O.  
 Rock River Machine Co., Inc., Janesville, Wis.  
 Schatz Mfg. Co., Poughkeepsie, N. Y.  
 Wiedemann Machine Co., Philadelphia, Pa.  
 Yoder Co., Cleveland, O.

### SHEET METAL PARTS

*See Mouldings and Trim; also Stampings, Metal*

### SHEETS, ALLOY

Allegheny Steel Co., Brackenridge, Pa.  
 ● American Brass Co., Waterbury, Conn. (Copper Alloys)  
 ● American Rolling Mill Co., Middletown, O. (Stainless Steel)  
 ● Carnegie-Illinois Steel Co., Pittsburgh, Pa. (Copper, High  
 Finish and Stainless Steel)  
 Crucible Steel Co. of America, New York City  
 Duriron Co., Inc., Dayton, O. (Chromium-Nickel)  
 Inland Steel Co., Chicago, Ill.  
 ● International Nickel Co., Inc., New York City (Monel).  
 Lukens Steel Co., Coatesville, Pa.  
 Newport Rolling Mill Co., Newport, Ky. (Pure Iron-Copper  
 Alloy)  
 ● Republic Steel Corp., Cleveland, O. (Steel)  
 Sharon Steel Corp., Sharon, Pa.  
 ● United States Steel Corp., Pittsburgh, Pa.  
 Wheeling Steel Corp., Wheeling, W. Va. (Cop-R-Loy)  
 ● Youngstown Sheet & Tube Co., Youngstown, O.

### SHEETS, ALUMINUM

Aluminum Company of America, Pittsburgh, Pa.  
 Fairmont Aluminum Co., Fairmont, W. Va.

### SHEETS, CLAD

Allegheny Steel Co., Brackenridge, Pa.  
 Crucible Steel Co. of America, New York City  
 ● International Nickel Co., Inc., New York City (Nickel Clad)  
 Lukens Steel Co., Coatesville, Pa.

### SHEETS, COPPER

● American Brass Co., Waterbury, Conn.  
 Bridgeport Brass Co., Bridgeport, Conn.  
 Chase Brass & Copper Co., Inc., Waterbury, Conn.  
 ● Hussey & Co., C. G., Pittsburgh, Pa.  
 National Brass & Copper Co., Inc., Pittsburgh, Pa.  
 New Haven Copper Co., Seymour, Conn.  
 Revere Copper and Brass Incorporated, New York City.  
 U. S. Brass & Copper Co., Hyde Park, Mass.

### SHEETS, COPPER BEARING STEEL

● American Rolling Mill Co., Middletown, O.  
 Apollo Steel Co., Apollo, Pa.  
 Bethlehem Steel Co., Bethlehem, Pa.  
 ● Carnegie-Illinois Steel Co., Pittsburgh, Pa.  
 Columbia Steel Co., San Francisco, Cal.  
 Granite City Steel Co., Granite City, Ill.  
 Gulf States Steel Co., Birmingham, Ala.  
 Inland Steel Co., Chicago, Ill.  
 Jones & Laughlin Steel Corporation, Pittsburgh, Pa.  
 Lukens Steel Co., Coatesville, Pa.  
 Mahoning Valley Steel Co., Niles, O.  
 New Delphos Mfg. Co., Delphos, O. (Galvanized Steel)  
 Newport Rolling Mill Co., Newport, Ky.  
 Niles Rolling Mill Co., Niles, O.  
 Otis Steel Co., Cleveland, O.  
 Reeves Steel & Mfg. Co., Dover, O.  
 ● Republic Steel Corp., Cleveland, O.  
 ● Superior Sheet Steel Co., Canton, O.  
 Tennessee Coal, Iron & Railroad Co., Birmingham, Ala.  
 ● United States Steel Corp., Pittsburgh, Pa.  
 Weirton Steel Co., Weirton, W. Va.  
 Wheeling Corrugating Co., Wheeling, W. Va.  
 Wheeling Metal & Mfg. Co., Wheeling, W. Va.  
 Wheeling Steel Corp., Wheeling, W. Va.  
 ● Youngstown Sheet & Tube Co., Youngstown, O.

### SHEETS, COPPER, LEAD COATED

● American Brass Co., Waterbury, Conn.  
 Chase Brass & Copper Co., Inc., Waterbury, Conn.  
 ● Hussey & Co., C. G., Pittsburgh, Pa.  
 Ledkote Products Co., Long Island City, N. Y.  
 National Brass & Copper Co., Inc., Pittsburgh, Pa.  
 New Haven Copper Co., Seymour, Conn.  
 Revere Copper and Brass Incorporated, New York City.  
 U. S. Brass & Copper Co., Hyde Park, Mass.  
 Wheeling Metal & Mfg. Co., Wheeling, W. Va.

### SHEETS, GALVANNEALED

Bethlehem Steel Co., Bethlehem, Pa.  
 ● Carnegie-Illinois Steel Co., Pittsburgh, Pa.  
 Continental Steel Corp., Kokomo, Ind.  
 Granite City Steel Co., Granite City, Ill.  
 Inland Steel Co., Chicago, Ill.  
 Newport Rolling Mill Co., Newport, Ky.

- Republic Steel Corp., Cleveland, O.
- Sharon Steel Corp., Sharon, Pa.
- Superior Sheet Steel Co., Canton, O.
- Tennessee Coal, Iron & Railroad Co., Birmingham, Ala.
- United States Steel Corp., Pittsburgh, Pa.
- Youngstown Sheet & Tube Co., Youngstown, O.

### SHEETS, LEAD

- Andrews Lead Co., Inc., Long Island City, N. Y.  
 Belmont Smelting & Refining Works, Inc., Brooklyn, N. Y.  
 Eagle Picher Lead Co., Cincinnati, O.  
 Flemm Lead Co., Inc., Long Island City, N. Y.  
 Lissberger & Son, Inc., Marks, Long Island City, N. Y.  
 National Lead Co., New York City.  
 Rochester Lead Works, Rochester, N. Y.  
 Standard Rolling Mills, Inc., Brooklyn, N. Y.

### SHEETS, SPECIAL METAL

(Nickel Zinc, Chrome Zinc, Nickel Coated Copper, Chromium Coated Copper, Nickel Coated Steel, Chromium Coated Steel, Chromium Coated Nickel Silver, Zinc Brass, Zinc Copper, etc.)

- American Nickeloid Co., Peru, Ill.  
 Bridgeport Brass Co., Bridgeport, Conn.  
 Chase Brass & Copper Co., Inc., Waterbury, Conn.  
 ● Hussey & Co., C. G., Pittsburgh, Pa.  
 Ingersoll Steel & Disc Div. Borg-Warner Corp., Chicago, Ill.  
 Lukens Steel Co., Coatesville, Pa.  
 Lustrco Coated Sheets Co., Pittsburgh, Pa.  
 ● Lyon, Conklin & Co., Inc., Baltimore, Md.  
 Maysteel Products, Inc., Mayville, Wis.  
 National Sheet Metal Co., Peru, Ill.  
 Revere Copper and Brass Incorporated, New York City.  
 Wilder Manufacturing Company, Niles, O.

### SHEETS, STAINLESS

- Allegheny Steel Co., Brackenridge, Pa.  
 ● American Rolling Mill Co., Middletown, O.  
 Bethlehem Steel Co., Bethlehem, Pa.  
 ● Carnegie-Illinois Steel Co., Pittsburgh, Pa.  
 Crucible Steel Co. of America, New York City (Two-Ply)  
 Ingersoll Steel & Disc Div. Borg-Warner Corp., Chicago, Ill. (Two-ply)  
 ● International Nickel Co., New York City (Monel)  
 Jessop Steel Co., Washington, Pa.  
 Ludlum Steel Co., Watervliet, N. Y.  
 ● Republic Steel Corp., Youngstown, O.  
 ● Ryerson & Son, Inc., Jos. T., Chicago, Ill.  
 Sharon Steel Corp., Sharon, Pa.  
 Superior Steel Corp., Pittsburgh, Pa.  
 ● United States Steel Corp., Pittsburgh, Pa.  
 Universal-Cyclops Steel Corp., Bridgeville, Pa., and Titusville, Pa.

### SHEETS, STEEL

(Polished and Blue, Corrugated and Plain, Black, Terne and Galvanized)

- Allegheny Steel Co., Brackenridge, Pa.  
 ● American Rolling Mill Co., Middletown, O.  
 Apollo Steel Co., Apollo, Pa.  
 Berger Mfg. Co., Div. of Republic Steel Corp., Canton, O.  
 Bethlehem Steel Co., Bethlehem, Pa.  
 ● Carnegie-Illinois Steel Co., Pittsburgh, Pa.  
 Columbia Steel Co., San Francisco, Cal.  
 Continental Steel Corp., Kokomo, Ind.  
 Crucible Steel Company of America, New York City.  
 Empire Sheet & Tin Plate Co., Mansfield, O.  
 Follansbee Brothers Co., Pittsburgh, Pa.  
 Granite City Steel Co., Granite City, Ill.  
 Gulf States Steel Co., Birmingham, Ala.  
 Inland Steel Co., Chicago, Ill.  
 Jones & Laughlin Steel Corp., Pittsburgh, Pa.  
 Lukens Steel Co., Coatesville, Pa.  
 ● Lyon, Conklin & Co., Inc., Baltimore, Md.  
 Mahoning Valley Steel Co., Niles, O.  
 Newport Rolling Mill Co., Newport, Ky.  
 Niles Rolling Mill Co., Niles, O.  
 Otis Steel Co., Cleveland, O.  
 Parkersburg Iron & Steel Co., Parkersburg, W. Va.  
 Reading Iron Co., Philadelphia, Pa. (Genuine Wrought Iron)  
 Reeves Steel & Mfg. Co., Dover, O.  
 ● Republic Steel Corp., Cleveland, O.  
 ● Ryerson & Son, Inc., Jos. T., Chicago, Ill.  
 ● Superior Sheet Steel Co., Canton, O.  
 Tennessee Coal, Iron & Railroad Co., Birmingham, Ala.  
 ● United States Steel Corp., Pittsburgh, Pa.  
 Weirton Steel Co., Weirton, W. Va.  
 Wheeling Corrugating Co., Wheeling, W. Va.  
 Wheeling Metal & Mfg. Co., Wheeling, W. Va.  
 Wheeling Steel Corp., Wheeling, W. Va.  
 Wood Steel Co., Alan, Conshohocken, Pa.  
 ● Youngstown Sheet & Tube Co., Youngstown, O.

### SHEETS, TIN

- Belmont Smelting & Refining Works, Inc., Brooklyn, N. Y.  
 Bethlehem Steel Co., Bethlehem, Pa.  
 ● Carnegie-Illinois Steel Co., Pittsburgh, Pa.  
 Eagle Picher Lead Co., Cincinnati, O.  
 Empire Sheet & Tin Plate Co., Mansfield, O.  
 Follansbee Brothers Co., Pittsburgh, Pa.  
 Granite City Steel Co., Granite City, Ill.  
 Inland Steel Co., Chicago, Ill.  
 Jones & Laughlin Steel Corp., Pittsburgh, Pa. (Tinned)  
 ● Lyon, Conklin & Co., Inc., Baltimore, Md.  
 National Lead Co., New York City.  
 Rochester Lead Works, Inc., Rochester, N. Y.  
 ● Ryerson & Son, Inc., Jos. T., Chicago, Ill.  
 Standard Rolling Mills, Inc., Brooklyn, N. Y.  
 ● United States Steel Corp., Pittsburgh, Pa.  
 Wheeling Corrugating Co., Wheeling, W. Va.  
 Weirton Steel Co., Weirton, W. Va.  
 Wheeling Steel Corp., Wheeling, W. Va.  
 ● Youngstown Sheet & Tube Co., Youngstown, O.

### SHEETS, ZINC

- American Nickeloid Co., Peru, Ill.  
 American Zinc Products Co., Greencastle, Ind.  
 Belmont Smelting & Refining Works, Inc., Brooklyn, N. Y.  
 Hegeler Zinc Co., Danville, Ill.  
 Illinois Zinc Co., Peru, Ill.  
 Matthiessen & Hegeler Zinc Co., La Salle, Ill.  
 New Jersey Zinc Sales Co., New York City.  
 Wheeling Corrugating Co., Wheeling, W. Va. (Coated)  
 Wheeling Steel Corp., Wheeling, W. Va. (Coated)

### SHIELDS, WARM AIR REGISTER

- Gammeter Co., W. F., Cadiz, O. (with Humidifier)  
 Gillian Mfg. Co., Ferndale, Mich.  
 Kauffman Air Conditioning Corp., St. Louis, Mo.  
 Patent Novelty Co., Fulton, Ill. (With Humidifier)  
 Pentecost & Craft Co., Terre Haute, Ind.  
 Schoedinger, F. O., Co., Columbus, O.  
 Somers, Inc., H. J., Detroit, Mich.

### SHINGLES AND TILE, METAL

- Berger Mfg. Co., Div. of Republic Steel Corp., Canton, O.  
 Cincinnati Sheet Metal & Roofing Co., Cincinnati, O.  
 Columbian Enameling & Stamping Co., Terre Haute, Ind.  
 Edwards Mfg. Co., Inc., Cincinnati, O.  
 Fingles, Inc., W. A., Baltimore, Md.  
 Globe Iron Roofing & Corrugating Co., Cincinnati, O.  
 Gulf States Steel Co., Birmingham, Ala.  
 International Steel Co., Evansville, Ind.  
 ● Milcor Steel Co., Milwaukee, Wis.  
 Miller & Doing, Inc., Brooklyn, N. Y.  
 New Haven Copper Co., Seymour, Conn. (Copper)  
 Newport Rolling Mill Co., Newport, Ky.  
 Norman Sheet Metal Mfg. Co., W. F., Nevada, Mo.  
 Reeves Steel & Mfg. Co., Dover, O.  
 St. Paul Corrugating Co., St. Paul, Minn.  
 Southern States Iron Roofing Co., Savannah, Ga.  
 Tiffin Art Metal Co., Tiffin, O.  
 Wheeling Corrugating Co., Wheeling, W. Va.  
 Wheeling Metal & Mfg. Co., Wheeling, W. Va.

### SHUTTERS

See Louvers and Shutters

### SKYLIGHTS

- American Barlock Co., Inc., Long Island City, N. Y.  
 American Sheet Metal Works, New Orleans, La.  
 Anderson Mfg. Co., Des Moines, Ia.  
 Beatrice Steel Tank Mfg. Co., Beatrice, Nebr.  
 Biersach & Niedermeyer Co., Milwaukee, Wis.  
 California Cornice, Steel and Supply Corp., Los Angeles, Cal.  
 Chicago Metal Mfg. Co., Chicago, Ill.  
 Cincinnati Sheet Metal & Roofing Co., Cincinnati, O.  
 Danzer Metal Works Co., Hagerstown, Md.  
 Decatur Iron & Steel Co., Decatur, Ala.  
 Drouve Co., G., Fairfield, Conn.  
 Edwards Mfg. Co., Inc., Cincinnati, O.  
 Falstrom Co., Passaic, N. J.  
 Fingles, Inc., W. A., Baltimore, Md.  
 General Sheet Metal Works, Inc., Bridgeport, Conn.  
 Goethel Co., Alfred C., Milwaukee, Wis.  
 Herrmann & Grace Co., Brooklyn, N. Y.  
 Hirschman Co., Inc., W. F., Buffalo, N. Y.  
 Hudson Equipment Corp., Minneapolis, Minn.  
 International Steel Co., Evansville, Ind.  
 Klauer Mfg. Co., Dubuque, Ia.  
 Lee & Son Co., Thomas, Cincinnati, O.  
 Martin Metal Mfg. Co., Wichita, Kan.  
 ● Meyer & Bro. Co., F., Peoria, Ill.  
 Midwest Aluminum Products, Inc., Milwaukee, Wis.

- Midwest Ventilating Works, Milwaukee, Wis.  
 ● Milcor Steel Co., Milwaukee, Wis.  
 ● Mohler Co., The J. K., Ephrata, Pa.  
 Norman Sheet Metal Mfg. Co., W. F., Nevada, Mo.  
 Park City Cornice Works, Inc., Bridgeport, Conn.  
 Perkinson & Brown, Chicago, Ill.  
 Providence Cornice Co., Providence, R. I.  
 Robertson Co., H. H., Pittsburgh, Pa.  
 Ryniker Sheet Metal Works, Inc., Billings, Mont.  
 St. Paul Corrugating Co., St. Paul, Minn.  
 Schoedinger, F. O., Co., Columbus, O.  
 Southbridge Roofing Co., Inc., Southbridge, Mass.  
 Southern States Iron Roofing Co., Savannah, Ga.  
 Van Noorden Co., E., Boston, Mass.  
 Vent-O-Lite Co., Chicago, Ill. (Ventilating)  
 Ward Co., H. H., Chester, Pa.  
 Watson Co., Inc., Jas. H., Bradley, Ill.  
 Wheeling Metal & Mfg. Co., Wheeling, W. Va.  
 Willis Mfg. Co., Galesburg, Ill.  
 Windshield Scupper Co., Div. Sargent Bldg. Specialties Co.,  
 New York City (Scuppers)  
 York Corrugating Co., York, Pa.

**SKYLIGHT LIFTS***See Lifts, Skylight***SMOKE PIPE***See Pipe, Smoke***SMOKE PIPE DAMPERS***See Dampers, Smoke Pipe***SMOKE PIPE FITTINGS***See Fittings and Accessories, Smoke Pipe***SNIPS AND SHEARS, BENCH AND HAND**

- Armstrong-Blum Mfg. Co., Chicago, Ill.  
 ● Bartlett Mfg. Co., Detroit, Mich.  
 ● Beverly Throatless Shear Co., Chicago, Ill.  
 ● Bremil Mfg. Co., Erie, Pa. (Shears)  
 Clauss Shear Co., Fremont, O.  
 G. D. S. Machinery & Supply Co., New York City.  
 Grobet File Corp. of America, New York City.  
 ● Marshalltown Mfg. Co., Marshalltown, Ia.  
 ● Niagara Machine & Tool Works, Buffalo, N. Y.  
 ● Peck, Stow & Wilcox Co., Southington, Conn.  
 Rupp Forge & Shear Co., Cleveland, O.  
 ● Viking Shear Co., Erie, Pa.  
 ● Wiss & Sons Co., J., Newark, N. J.

**SOLDER**

- Allen Co., L. B., Chicago, Ill.  
 Alumaweld Co. of America, Chicago, Ill.  
 ● American Brass Co., Waterbury, Conn.  
 Andrews Lead Co., Inc., Long Island City, N. Y.  
 Belmont Smelting & Refining Works, Inc., Brooklyn, N. Y.  
 Berger Mfg. Co., Div. of Republic Steel Corp., Canton, O.  
 Consolidated Metals Corp., Detroit, Mich.  
 Downs-Smith Brass & Copper Co., New York City.  
 Eagle-Picher Co., Cincinnati, O. (Bar and Wire)  
 Empire Metal Co., Syracuse, N. Y.  
 Gardiner Metal Co., Chicago, Ill.  
 Handy & Harmon, New York City.  
 Johnston Tin Foil & Metal Co., St. Louis, Mo.  
 Kester Solder Co., Chicago, Ill.  
 Lissberger & Son, Inc., Marks, Long Island City, N. Y.  
 Lukens Metal Co., Thos. F., Philadelphia, Pa.  
 Merchant & Evans Co., Philadelphia, Pa.  
 National Lead Co., New York City.  
 New Delphos Mfg. Co., Delphos, O.  
 Ruby Chemical Co., Columbus, O. (Acid and Rosin Core)  
 ● Ryerson & Son, Inc., Joseph T., Chicago, Ill.  
 Standard Rolling Mills, Inc., Brooklyn, N. Y.  
 Wagner, C. DeWitt, Cedar Rapids, Ia. (Aluminum)

**SOLDERING COPPERS***See Coppers, Soldering***SOLDERING FLUX***See Flux, Soldering***SOLDERING FURNACES***See Furnaces, Soldering***SOLDERING IRONS***See Coppers, Soldering***SOLDERING TORCHES***See Torches, Soldering***SOLENOID VALVES***See Valves, Solenoid***SOUND DEADENERS***See Insulation, Sound Deadening, Ducts***SOUND LEVEL INDICATORS***See Indicators, Sound Level***SPRAY GUNS***See Guns, Spray***SPOT WELDERS***See Welders, Spot***SPRAY NOZZLES***See Nozzles, Spray***STEEL CEILINGS***See Ceilings, Metal***STAMPINGS, METAL**

- Berger Mfg. Co., Div. of Republic Steel Corp., Canton, O.  
 Bossert Corp., Utica, N. Y.  
 Budke Stamping Co., Cannonsburg, Pa.  
 Chase Brass & Copper Co., Inc., Waterbury, Conn.  
 ● Dail Steel Products Co., Lansing, Mich.  
 Dayton Rogers Mfg. Co., Minneapolis, Minn.  
 Friedley-Voshardt Co., Chicago, Ill.  
 General Metal Products Co., St. Louis, Mo.  
 Geuder, Paeschke & Frey Co., Milwaukee, Wis.  
 Gillian Mfg. Co., Ferndale, Mich.  
 Globe Machine & Stamping Co., Cleveland, O.  
 Lukens Steel Co., Coatesville, Pa.  
 Martin-Parry Corp., York, Pa.  
 Maysteel Products, Inc., Mayville, Wis.  
 ● Meyer & Bro. Co., F., Peoria, Ill.  
 ● Osborn Co., J. M. & L. A., Cleveland, O.  
 Perrin Company, Edward C., Camden, N. J.  
 Royal-Apex Mfg. Corp., Brooklyn, N. Y.  
 Standard Stamping & Perforating Co., Chicago, Ill.  
 Wrought Washer Mfg. Co., Milwaukee, Wis.  
 Youngstown Pressed Steel Co., Warren, O.

**STOKER CONTROLS***See Controls, Stoker***STOKERS, DOMESTIC**

- Advance Appliance Co., Peoria, Ill.  
 Airtemp, Inc., Dayton, O.  
 Anchor Stove & Range Co., New Albany, Ind.  
 Apex Tool Co., Inc., Bridgeport, Conn.  
 Athens Plow Co., Athens, Tenn.  
 Auburn Stoker Co., Auburn, Ind.  
 Automatic Stoker Corp., Indianapolis, Ind.  
 Bardes Range & Foundry Co., E. H., Cincinnati, O.  
 Beckley Perforating Co., Garwood, N. J.  
 Bluffton Mfg. Co., Findlay, O.  
 Bros Boiler & Mfg. Co., Wm., Minneapolis, Minn.  
 Brownell Co., Dayton, O.  
 Burnham Stoker Co., Vancouver, Wash.  
 Burnwell Corp., Allentown, Pa.  
 ● Butler Mfg. Co., Kansas City, Mo.  
 Butler Street Foundry & Iron Co., Chicago, Ill.  
 Chicago Automatic Stoker Co., Not Inc., Chicago, Ill.  
 Christensen Machine Co., Salt Lake City, Utah.  
 Columbus Metal Products, Inc., Columbus, O.  
 Conco-Sampsel Stoker Corp., Mendota, Ill.  
 Cooper & Cooper, Inc., Pittsfield, Mass.  
 Dickson & Eddy, New York City.  
 Domestic Stoker Co., New York City.  
 Econocol Stoker Div. of Cotta Transmission Corp., Rockford, Ill.  
 Eddy Stoker Corp., Chicago, Ill.  
 Fairbanks, Morse & Co., Chicago, Ill.  
 Finnell Rotary Stokers, Inc., Elkhart, Ind.  
 Flynn and Emrich Co., Baltimore, Md.  
 Frederick Iron & Steel Co., Frederick, Md.  
 Fuel Savers, Inc., Harrisburg, Pa.  
 Furnaceslave, Inc., Indianapolis, Ind.  
 Gehl Bros. Mfg. Co., West Bend, Wis.  
 General Machine Co., Inc., New York City.  
 Germer Stove Co., Erie, Pa.  
 ● Hall-Neal Furnace Co., Indianapolis, Ind.  
 Hamilton Automatic Stoker Corp., Hamilton, O.



Heating Assurance, Inc., Spokane, Wash.  
 Heritage Stoker Sales, Inc., Chicago, Ill.  
 • Hess Warming and Ventilating Co., Chicago, Ill.  
 Holcomb & Hoke Mfg. Co., Indianapolis, Ind.  
 Illinois Iron & Bolt Co., Chicago, Ill.  
 Iron Fireman Mfg. Co., Cleveland, O.  
 Jacobson Machine Works, Inc., A. E., Minneapolis, Minn.  
 Kelvinator Corp., Detroit, Mich.  
 • Kol-Master Corp., Oregon, Ill.  
 Leach Co., Oshkosh, Wis.  
 Liberty Coal Burner Co., St. Louis, Mo.  
 Link Belt Co., Chicago, Ill.  
 • Meyer Furnace Co., Peoria, Ill.  
 Model Mfg. Co., Richmond, Va.  
 Moloch Foundry & Machine Co., Kaukauna, Wis.  
 Morrissey & Co., Chicago, Ill.  
 Morse Chain Co., Ithaca, N. Y.  
 Motorstoker Div. of Hershey Machine & Foundry Co., Mannheim, Pa.  
 Muncie Gear Works, Inc., Muncie, Ind.  
 National Steam Pump Co., Upper Sandusky, O.  
 Nelson Corp., Herman, Moline, Ill.  
 Nomis Corp., Lafayette, Ind.  
 Norge Heating & Conditioning Div., Borg-Warner Corp., Detroit, Mich.  
 Ormsby-Gray Combustion Service, Inc., St. Louis, Mo.  
 Perfectaire Corp., Baltimore, Md.  
 Plymouth Industries, Inc., Plymouth, Ind.  
 Pulvokol, Inc., Minneapolis, Minn. (Pulverized Coal Burner)  
 Racine Stoker Mfg. Co., Racine, Wis.  
 Redi-Automatic Coal Burners, Inc., Spokane, Wash.  
 Riedon Stoker Corp., Seattle, Wash.  
 • Schwab Furnace & Mfg. Co., Milwaukee, Wis.  
 • Schwitzer-Cummins Co., Indianapolis, Ind.  
 • Scott-Newcomb, Inc., St. Louis, Mo.  
 Sinker-Davis Co., Indianapolis, Ind.  
 Steel Products Engineering Co., Springfield, O.  
 Sto-Coke, Inc., Indianapolis, Ind.  
 Stok-A-Fire Co., St. Louis, Mo.  
 Stokerette Mfg. Co., Chicago, Ill.  
 Stokermatic Co., Salt Lake City, Utah.  
 Stoker Products, Inc., Decatur, Ill.  
 Stokers, Inc., Detroit, Mich.  
 Tropic-Air Stoker Co., Canton, O.  
 Whiting Corp., Harvey, Ill.  
 Will-Burt Co., Orrville, O.  
 Winkler Mfg. Corp., Lebanon, Ind.

### STOKERS, INDUSTRIAL AND COMMERCIAL

Advanced Engineering Co., Philadelphia, Pa.  
 American Coal Burner Co., Chicago, Ill.  
 Anchor Stove & Range Co., New Albany, Ind.  
 Auburn Stoker Co., Auburn, Ind.  
 Bluffton Mfg. Co., Findlay, O.  
 Bros Boiler & Mfg. Co., Wm., Minneapolis, Minn.  
 Brownell Co., Dayton, O.  
 • Butler Mfg. Co., Kansas City, Mo.  
 Butler Street Foundry & Iron Co., Chicago, Ill.  
 Canton Stoker Corp., Canton, O.  
 Carnes, Inc., John R., Lima, O.  
 Chicago Automatic Stoker Co., Not Inc., Chicago, Ill.  
 Christensen Machine Co., Salt Lake City, Utah.  
 Columbus Metal Products, Inc., Columbus, O.  
 Combustion Engineering Co., Inc., New York City.  
 Conco-Sampsel Stoker Corp., Mendota, Ill.  
 Delta Stoker Co., North Chicago, Ill.  
 Detroit Stoker Co., Detroit, Mich.  
 Diamond Castings Co., Johnsonburg, Pa.  
 Domestic Stoker Co., New York City.  
 Econocol Stoker Div. of Cotta Transmission Corp., Rockford, Ill.  
 Eddy Stoker Corp., Chicago, Ill.  
 Fairbanks, Morse & Co., Chicago, Ill.  
 Flynn & Emrich Co., Baltimore, Md.  
 Frederick Iron & Steel Co., Frederick, Md.  
 Fuel Savers, Inc., Harrisburg, Pa.  
 Gehl Bros. Mfg. Co., West Bend, Wis.  
 Hamilton Automatic Stoker Corp., Hamilton, O.  
 Hare Stoker Corp., Detroit, Mich.  
 Heating Assurance, Inc., Spokane, Wash.  
 Her-Born Eng. & Mfg. Co., Sandusky, O.  
 Heritage Stoker Sales, Inc., Chicago, Ill.  
 Holcomb & Hoke Mfg. Co., Indianapolis, Ind.  
 Illinois Iron & Bolt Co., Chicago, Ill.  
 Iron Fireman Mfg. Co., Cleveland, O.  
 Jacobson Machine Works, Inc., A. E., Minneapolis, Minn.  
 Johnston & Jennings Co., Cleveland, O.  
 • Jordan & Co., Paul R., Indianapolis, Ind.  
 • Kol-Master Corp., Oregon, Ill.  
 Leach Co., Oshkosh, Wis.  
 Link Belt Co., Chicago, Ill.  
 McClave-Brooks Co., Scranton, Pa.  
 Marion Machine Foundry & Supply Co., Marion, Ind.  
 Model Mfg. Co., Richmond, Va.  
 Moloch Foundry & Machine Co., Kaukauna, Wis.  
 Morrissey & Co., Chicago, Ill.  
 Motorstoker Div. of Hershey Machine & Foundry Co., Mannheim, Pa.

National Steam Pump Co., Upper Sandusky, O.  
 Neemes Foundry, Inc., Troy, N. Y.  
 Nomis Corp., Lafayette, Ind.  
 Ormsby-Gray Combustion Service, Inc., St. Louis, Mo.  
 Over-Spread Stoker Co., Ottawa, Ill.  
 Patterson Foundry & Machine Co., East Liverpool, O.  
 Perfectaire Corp., Baltimore, Md.  
 Perfection Grate & Stoker Co., Springfield, Mass.  
 Plymouth Industries, Inc., Plymouth, Ind.  
 Redi-Automatic Coal Burners, Inc., Spokane, Wash.  
 Rosedale Fdry. & Mach. Co., N. S., Pittsburgh, Pa.  
 • Schwitzer-Cummins Co., Indianapolis, Ind.  
 Steel Products Engineering Co., Springfield, O.  
 Stok-a-Fire Co., St. Louis, Mo.  
 Stokermatic Co., Salt Lake City, Utah.  
 Stoker Products, Inc., Decatur, Ill.  
 Stokers, Inc., Detroit, Mich.  
 Tropic-Air Stoker Co., Canton, O.  
 Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.  
 Whiting Corp., Harvey, Ill.  
 Will-Burt Co., Orrville, O.  
 Winkler Mfg. Corp., Lebanon, Ind.

### STOVE PIPE

*See Pipe, Stove*

### STRAINERS, CONDUCTOR

*See Fittings and Accessories, Conductor*

### STRAPS, LEADER

*See Fittings and Accessories, Conductor*

### STRUCTURAL SHAPES

*See Angles, Bars, Beams, Channels and Tees (Structural Shapes)*

### SWITCHES, MAGNETIC

Allen-Bradley Co., Milwaukee, Wis.  
 Automatic Switch Co., New York City.  
 Bender Warrick Corp., Birmingham, Mich.  
 Clark Controller Co., Cleveland, O.  
 • Cook Electric Co., Chicago, Ill.  
 Cutler-Hammer, Inc., Milwaukee, Wis.  
 Detroit Lubricator Co., Detroit, Mich.  
 Dunn, Inc., Struthers, Philadelphia, Pa.  
 Electric Controller & Mfg. Co., Cleveland, O.  
 Guardian Electric Mfg. Co., Chicago, Ill.  
 H-B Instrument Co., Inc., Philadelphia, Pa.  
 Hart Mfg. Co., Hartford, Conn. (Mercury Tube).  
 Industrial Engineering Corp., Evansville, Ind.  
 Micro Switch Corp., Freeport, Ill.  
 • Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.  
 Monitor Controller Co., Baltimore, Md.  
 Penn Electric Switch Co., Goshen, Ind.  
 Perfex Corp., Milwaukee, Wis.  
 Ranco, Inc., Columbus, O.  
 Square D Co., Detroit, Mich.  
 Trumbull Electric Mfg. Co., Plainville, Conn.  
 Ward Leonard Electric Co., Mt. Vernon, N. Y.  
 Westinghouse Electric & Mfg. Co., Mansfield, O.

### SWITCHES, MANUAL

Allen-Bradley Co., Milwaukee, Wis.  
 Bender Warrick Corp., Birmingham, Mich.  
 Cutler-Hammer, Inc., Milwaukee, Wis.  
 Electric Controller & Mfg. Co., Cleveland, O.  
 Industrial Engineering Corp., Evansville, Ind.  
 Micro Switch Corp., Freeport, Ill.  
 Square D Co., Detroit, Mich.  
 Trumbull Electric Mfg. Co., Plainville, Conn.  
 Westinghouse Electric & Mfg. Co., Mansfield, O.

### SWITCHES, TIME

Conco-Sampsel Stoker Corp., Mendota, Ill.  
 • Gleason-Avery, Inc., Auburn, N. Y.  
 Guardian Electric Mfg. Co., Chicago, Ill.  
 Hansen Mfg. Co., Princeton, Ind.  
 Industrial Engineering Corp., Evansville, Ind.  
 Mercoild Corp., Chicago, Ill.  
 Micro Switch Corp., Freeport, Ill.  
 Paragon Electric Co., Chicago, Ill.  
 • Penn Electric Switch Co., Goshen, Ind.  
 Rhodes, Inc., M. H., Hartford, Conn.  
 Sangamo Electric Co., Springfield, Ill.  
 Spencer Thermostat Co., Attleboro, Mass.  
 Tagliabue Mfg. Co., C. J., Brooklyn, N. Y.  
 Tork Clock Co., Inc., Mt. Vernon, N. Y.  
 Ward Leonard Electric Co., Mt. Vernon, N. Y.

**TEES, FURNACE PIPE***See Fittings and Accessories, Furnace Pipe***TEMPERATURE CONTROLS***See Thermostats***TEMPERATURE RECORDERS***See Recorders, Temperature***TINPLATE***See Sheets, Tin***TIPS, DAMPER***See Clips and Tips, Damper***THERMOMETERS, INDICATING**

- Bristol Co., Waterbury, Conn.
- Brown Instrument Co., Div. of Minneapolis-Honeywell Reg. Co., Philadelphia, Pa.
- Builders Iron Foundry, Providence, R. I.
- Cooper Oven Thermometer Co., Pequabuck, Conn.
- Fee & Stemwedel, Inc., Chicago, Ill.
- Friez & Sons, Inc., Julien P., Baltimore, Md.
- G. M. Mfg. Co., New York City.
- H-B Instrument Co., Inc., Philadelphia, Pa.
- Illinois Testing Laboratories, Inc., Chicago, Ill.
- Leeds & Northrup Co., Philadelphia, Pa.
- Manning, Maxwell & Moore, Inc., Bridgeport, Conn.
- Micro Switch Corp., Freeport, Ill.
- Moeller Instrument Co., Brooklyn, N. Y.
- Precision Thermometer & Instrument Co., Philadelphia, Pa.
- Preferred Utilities Mfg. Corp., New York City.
- Tagliabue Mfg. Co., C. J., Brooklyn, N. Y.
- Taylor Instrument Companies, Rochester, N. Y.
- Uehling Instrument Co., Paterson, N. J.
- Weston Electrical Instrument Corp., Newark, N. J.

**THERMOSTATS**

- Automatic Products Co., Milwaukee, Wis.
- Barber-Colman Co., Rockford, Ill.
- Bristol Co., Waterbury, Conn.
- Cook Electric Co., Chicago, Ill.
- Crise Electric Co., Mount Vernon, O.
- Detroit Lubricator Co., Detroit, Mich.
- Dickson & Eddy, New York City.
- Dunn, Inc., Struthers, Philadelphia, Pa.
- Friez & Sons, Inc., Julien P., Baltimore, Md.
- General Controls Co., San Francisco, Cal. and Cleveland, O.
- Gleason-Avery, Inc., Auburn, N. Y.
- Johnson Service Co., Milwaukee, Wis.
- H-B Instrument Co., Inc., Philadelphia, Pa.
- Hart Mfg. Co., Hartford, Conn. (Direct Break).
- McCorkle Co., D. H., Berkeley, Calif.
- Mercoild Corp., Chicago, Ill.
- Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
- National Regulator Co., Chicago, Ill.
- Penn Electric Switch Co., Goshen, Ind.
- Perfex Corp., Milwaukee, Wis.
- Pioneer Heat Regulator Division, Master Electric Co., Dayton, O.
- Powers Regulator Co., Chicago, Ill.
- Precision Thermometer & Instrument Co., Philadelphia, Pa.
- Ranco, Inc., Columbus, O.
- Rega Mfg. Co., Rochester, N. Y.
- Robertshaw-Thermostat Co., Youngwood, Pa.
- Russell Electric Co., Chicago, Ill.
- Sheer Co., H. M., Quincy, Ill.
- Spencer Thermostat Co., Attleboro, Mass.
- Tagliabue Mfg. Co., Brooklyn, N. Y.
- United Electric Controls Co., South Boston, Mass.
- White Mfg. Co., St. Paul, Minn.
- White-Rodgers Electric Co., St. Louis, Mo.
- Wilcolator Co., Newark, N. J.

**THERMOSTATS, HEAT ACCELERATED OR ANTICIPATING**

- Cook Electric Co., Chicago, Ill.
- Detroit Lubricator Co., Detroit, Mich.
- Friez & Sons, Inc., Julien P., Baltimore, Md.
- Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
- Pacific Gas Radiator Co., Los Angeles, Cal.
- Penn Electric Switch Co., Goshen, Ind.
- Perfex Corp., Milwaukee, Wis.
- Spencer Thermostat Co., Attleboro, Mass.

**THROUGH WALL FLASHINGS***See Flashings, Through Wall***TIME SWITCHES***See Switches, Time***TIMERS, ELECTRICAL**

- Dunn, Inc., Struthers, Philadelphia, Pa.
- Guardian Electric Mfg. Co., Chicago, Ill.
- Industrial Engineering Corp., Evansville, Ind.
- Penn Electric Switch Co., Goshen, Ind.
- Spencer Thermostat Co., Attleboro, Mass.
- Welding Timer Mfg. Co., Newark, N. J. (Welding).
- Zenith Electric Co., Inc., Chicago, Ill.

**TINNING FLUXES***See Compounds, Tinning***TOOLS, METAL WORKERS'**

- Bersted Co., Martin, Chicago, Ill. (Mallets)
- Champion Tool Co., Los Angeles, Cal. (Crimper).
- Chicago Rawhide Mfg. Co., Chicago, Ill. (Mallets)
- Crescent Tool Co., Jamestown, N. Y.
- Fowler Pem Co., Emeryville, Cal.
- Greene Tweed Co., New York City.
- Grob Brothers, Grafton, Wis. (Die Making Machinery)
- Grobet File Corp. of America, New York City.
- Hub Specialty Co., Somerville, Mass. (Awl)
- Miller Rubber Co., Inc., Akron, O.
- Misener Mfg. Co., Inc., Syracuse, N. Y. (Rotary Hack Saw)
- National Machine Tool Co., Racine, Wis.
- Niagara Machine & Tool Works, Buffalo, N. Y.
- Peck, Stow & Wilcox Co., Southington, Conn.
- Pencilsharp Awl & Tool Co., Evansville, Ind. (Scratch Awls).
- Poe, Ralph W., Canton, Ill. (Sheet Metal Cutters)
- Rock River Machine Co., Inc., Janesville, Wis.
- Skillsaw, Inc., Chicago, Ill.
- Stanley Rule & Level Plant, New Britain, Conn.
- Whitney Mfg. Co., W. A., Rockford, Ill.
- Whitney Metal Tool Co., Rockford, Ill.

**TOOLS, ROOFERS'**

- Aeroll Burner Co., Inc., West New York, N. J. (Military Pots).
- Elermann Floor Scraper Co., Brooklyn, N. Y. (Tar).
- Littleford Bros., Cincinnati, O.
- Milcor Steel Co., Milwaukee, Wis.
- Niagara Machine & Tool Works, Buffalo, N. Y.
- Peck, Stow & Wilcox Co., Southington, Conn.
- Pencilsharp Awl & Tool Co., Evansville, Ind.

**TOPS, CHIMNEY***See Caps and Tops, Chimney***TORCHES, BRAZING, CUTTING, WELDING, OXY-ACETYLENE**

- Air Reduction Sales Co., New York City.
- Bastian-Blessing Co., Chicago, Ill.
- Bernz Co., Inc., Otto, Rochester, N. Y. (Brazing)
- Burdett Mfg. Co., Chicago, Ill.
- Gasweld & Airway, Inc., Chicago, Ill.
- Harris Calorific Co., Cleveland, O.
- Imperial Brass Mfg. Co., Chicago, Ill.
- Linde Air Products Co., New York City.
- Milburn Co., Alexander, Baltimore, Md.
- Miller Equipment Co., Cincinnati, O.
- Modern Engineering Co., St. Louis, Mo.
- Sight Feed Generator Co., Richmond, Ind.
- Smith Welding Equipment Corp., Minneapolis, Minn.
- Torchweld Equipment Co., Chicago, Ill.
- Welding Apparatus Co., Chicago, Ill.

**TORCHES, SOLDERING**

- Bernz Co., Inc., Otto, Rochester, N. Y.
- Clayton & Lambert Mfg. Co., Detroit, Mich.
- Detroit Torch & Mfg. Co., Detroit, Mich.
- Diener Mfg. Co., Geo. W., Chicago, Ill.
- Everhot Mfg. Co., Maywood, Ill.
- Gasweld & Airway, Inc., Chicago, Ill.
- Graham & Co., Inc., John H., New York City.
- Harris Calorific Co., Cleveland, O.
- Ideal Commutator Dresser Co., Sycamore, Ill.
- Imperial Brass Mfg. Co., Chicago, Ill.
- Johnson Gas Appliance Co., Cedar Rapids, Ia.
- Milburn Co., Alexander, Baltimore, Md.
- Miller Equipment Co., Cincinnati, O.
- Sight Feed Generator Co., Richmond, Ind.
- Smith Welding Equipment Corp., Minneapolis, Minn.
- Torchweld Equipment Co., Chicago, Ill.
- Turner Brass Works, Sycamore, Ill.
- Wall Mfg. Supply Co., P., Pittsburgh, Pa.
- Welding Apparatus Co., Chicago, Ill.



**TRANSFORMERS, LOW VOLTAGE**

- American Transformer Co., Newark, N. J.
- Barber-Colman Co., Rockford, Ill.
- Cook Electric Co., Chicago, Ill.
- Detroit Lubricator Co., Detroit, Mich.
- Friez & Sons, Inc., Julien P., Baltimore, Md.
- General Controls Co., San Francisco, Cal.
- Jefferson Electric Co., Bellwood, Ill.
- Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
- Russell Electric Co., Chicago, Ill.
- Taylor-Winfield Corp., Warren, O.
- Wagner Electric Corp., St. Louis, Mo.
- Webster Electric Co., Racine, Wis.
- White Mfg. Co., St. Paul, Minn.

**TRANSMISSION DRIVES***See Belts and Pulleys***TRIM, ORNAMENTAL***See Moulding and Trim, Ornamental***TUBING, COPPER**

- American Brass Co., Waterbury, Conn.
- Bridgeport Brass Co., Bridgeport, Conn.
- Chase Brass & Copper Co., Inc., Waterbury, Conn.
- Colonial Stove Co., Specialties Division, Philadelphia, Pa.  
(Non Ferrous, Semi-rigid)
- Hussey & Co., C. G., Pittsburgh, Pa.
- Imperial Brass Mfg. Co., Chicago, Ill.
- Revere Copper and Brass Incorporated, New York City.
- Streamline Pipe & Fittings, Div. of Mueller Brass Co., Port  
Huron, Mich.
- Wolverine Tube Co., Detroit, Mich.

**UNITS, AIR CONDITIONING***See Air Conditioning Units***UNITS, WINDOW VENTILATOR AND FILTER**

- American Air Filter Co., Inc., Louisville, Ky.
- Amirton Co., New York, N. Y.
- Burrowes Corp., Portland, Me.
- Coppus Engineering Corp., Worcester, Mass.
- Davies Air Filter Co., New York, N. Y.
- Economy Electric Mfg. Co., Chicago, Ill.
- Falstrom Co., Passaic, N. J.
- Kaiserair Products Sales Co., Chicago, Ill.
- Kisco Co., Inc., St. Louis, Mo.
- National Laboratories, Inc., Boston, Mass.
- Perfex Corp., Unit Heater Div., Milwaukee, Wis.
- Reed Unit-Fans, Inc., New Orleans, La.
- Schwitzer-Cummins Co., Indianapolis, Ind.
- Somers, Inc., H. J., Detroit, Mich.
- Standard Air Conditioning, Inc., New York, N. Y.
- Staynew Filter Corp., Rochester, N. Y.
- Truscon Steel Co., Youngstown, O.
- Unified Air Conditioner Co., Duluth, Minn.
- Young Radiator Co., Racine, Wis.

**VACUUM CLEANERS FOR FURNACES***See Cleaners, Vacuum, Furnace***VALVES, GAS PRESSURE REGULATING**

- Atlas Valve Co., Newark, N. J.
- Barber Gas Burner Co., Cleveland, O.
- Bryant Corp., C. L., Cleveland, O.
- Bryant Heater Co., Cleveland, O.
- Detroit Lubricator Co., Detroit, Mich.
- Fisher Governor Co., Marshalltown, Ia.
- Fox Engineering Co., Boston, Mass.
- Friez & Sons, Inc., Julien P., Baltimore, Md.
- General Controls Co., San Francisco, Cal. and Cleveland, O.
- Hotstream Heater Co., Cleveland, O.
- Mercold Corp., Chicago, Ill.
- Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
- Pacific Gas Radiator Co., Los Angeles, Cal.
- Payne Furnace & Supply Co., Beverly Hills, Cal.
- Pittsburgh Equitable Meter Co., Pittsburgh, Pa.
- Roberts-Gordon Appliance Corp., Buffalo, N. Y.
- Tagliabue Mfg. Co., C. J., Brooklyn, N. Y.

**VALVES, HUMIDIFIER, WATER LEVEL**

- Air Conditioning Supply Co., Cleveland, O.
- Automatic Humidifier Co., Cedar Falls, Ia.
- Chandler Co., Cedar Rapids, Ia.
- Detroit Lubricator Co., Detroit, Mich.
- Fisher Governor Co., Marshalltown, Ia.
- G. & S. Tool Co., Detroit, Mich.
- McDonnell & Miller, Chicago, Ill.
- Maid-O'-Mist, Inc., Chicago, Ill.

- Monmouth Products Co., Cleveland, O.
- Parks-Cramer Co., Fitchburg, Mass.
- Scovill Mfg. Co., Morency-Van Buren Div., Sturgis, Mich.
- Skuttle Co., J. L., Detroit, Mich.
- Supreme Electric Products Corp., Rochester, N. Y.
- Turney Corp., Muskegon, Mich.
- Universal Blower Co., Birmingham, Mich.
- Wisconsin Humidifier Co., Milwaukee, Wis.

**VALVES, SOLENOID**

- Alco Valve Co., Inc., St. Louis, Mo.
- Automatic Products Co., Milwaukee, Wis.
- Automatic Switch Co., New York City.
- Barber-Colman Co., Rockford, Ill.
- Cutler-Hammer, Inc., Milwaukee, Wis.
- Detroit Lubricator Co., Detroit, Mich.
- Electric Valve Mfg. Co., Inc., New York City.
- Electromatic Corp., Chicago, Ill.
- Friez & Sons, Inc., Julien P., Baltimore, Md.
- General Controls Co., San Francisco, Cal. and Cleveland, O.
- General Electric Co., Schenectady, N. Y.
- Guardian Electric Mfg. Co., Chicago, Ill.
- McCorkle Co., D. H., Berkeley, Cal.
- Mercold Corp., Chicago, Ill.
- Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
- Pacific Gas Radiator Co., Los Angeles, Cal.
- Payne Furnace & Supply Co., Beverly Hills, Cal.
- Perfex Corp., Milwaukee, Wis.
- Supreme Electric Products Corp., Rochester, N. Y.

**VENETIAN BLINDS***See Blinds, Venetian***VENTILATING FANS***See Fans, Ventilating***VENTILATORS, CEILING**

- Airmaster Corp., Chicago, Ill.
- American Blower Corp., Detroit, Mich.
- Auer Register Co., Cleveland, O.
- Autovent Fan & Blower Co., Chicago, Ill.
- Best Register Co., Milwaukee, Wis.
- Burt Mfg. Co., Akron, O.
- Champion Blower & Forge Co., Lancaster, Pa.
- Danzer Metal Works Co., Hagerstown, Md.
- Decatur Iron & Steel Co., Decatur, Ala.
- Falstrom Co., Passaic, N. J.
- Gillian Mfg. Co., Ferndale, Mich.
- Hart & Cooley Mfg. Co., Chicago, Ill.
- Hudson Equipment Corp., Minneapolis, Minn.
- Lamneck Products, Inc., Columbus, O.
- Martin Metal Mfg. Co., Wichita, Kan.
- Milcor Steel Co., Milwaukee, Wis.
- Miller & Doing, Inc., Brooklyn, N. Y.
- Tiffin Art Metal Co., Tiffin, O.
- Tuttle & Bailey, Inc., New Britain, Conn.
- United States Register Co., Battle Creek, Mich.
- Universal Blower Co., Birmingham, Mich.

**VENTILATORS, MUSHROOM**

- Aeolus Dickinson, Chicago, Ill.
- American Blower Corp., Detroit, Mich.
- Best Register Co., Milwaukee, Wis.
- Burt Mfg. Co., Akron, O.
- Falstrom Co., Passaic, N. J.
- Industrial Sheet Metal Works, Inc., Detroit, Mich.
- Knowles Mushroom Ventilator Co., New York City.
- Mueller Furnace Co., L. J., Milwaukee, Wis.
- Tuttle & Bailey, Inc., New Britain, Conn.

**VENTILATORS, ROOF, FAN**

- Aeolus Dickinson, Chicago, Ill.
- Air Controls, Inc., Cleveland, O.
- Airmaster Corp., Chicago, Ill.
- Allen Corp., Detroit, Mich.
- American Blower Corp., Detroit, Mich.
- American Coolair Corp., Jacksonville, Fla.
- American Foundry & Furnace Co., Bloomington, Ill.
- American-Larson Ventilating Co., Pittsburgh, Pa.
- Arex Co., Chicago, Ill.
- Autovent Fan & Blower Co., Chicago, Ill.
- Belanger Fan & Blower Co., Detroit, Mich.
- Bishop & Babcock Sales Co., Cleveland, O.
- Blower Application Co., Milwaukee, Wis.
- Burt Mfg. Co., Akron, O.
- Century Fan & Ventilator Corp., New York City.
- Champion Blower & Forge Co., Lancaster, Pa.
- Clarage Fan Co., Kalamazoo, Mich.
- DeBothezat Ventilating Equipment Division, American Ma-  
chine & Metals, Inc., New York City.
- Economy Electric Mfg. Co., Cicero, Ill.
- Electrovent Fan & Mfg. Co., Chicago, Ill.



- Falstrom Co., Passaic, N. J.
- Fingles, Inc., W. A., Baltimore, Md.
- General Regulator Corp., Chicago, Ill.
- Goethel Co., Alfred C., Milwaukee, Wis.
- Hirschman Co., Inc., W. F., Buffalo, N. Y.
- Howes Co., S. M., Charlestown, Boston, Mass.
- Ilg Electric Ventilating Co., Chicago, Ill.
- Industrial Sheet Metal Works, Inc., Detroit, Mich.
- International Engineering Inc., Dayton, O.
- Iona Ventilator Co., Inc., Philadelphia, Pa.
- Jamar Co., Walker, Duluth, Minn.
- Johnson Fan & Blower Corp., Chicago, Ill.
- Jordan & Co., Paul R., Indianapolis, Ind.
- Lau Blower Co., Dayton, O.
- Mack Ventilator Co., Saugus, Mass.
- Marathon Electric Mfg. Corp., Wausau, Wis.
- Mohler Co., J. K., Ephrata, Pa.
- Myers Electric Co., Pittsburgh, Pa.
- New York Blower Co., Chicago, Ill.
- Puhl & Hepper Mfg. Co., Inc., St. Louis, Mo.
- Reed Unit-Fans, Inc., New Orleans, La.
- Royal Ventilator Co., Philadelphia, Pa.
- Russell Insulation Co., F. C., Baltimore, Md.
- Schwitzer-Cummins Co., Indianapolis, Ind.
- Sturtevant Co., B. F., Hyde Park, Boston, Mass.
- Uno Ventilator Co., Cliftondale, Mass.
- Viking Air Conditioning Corp., Cleveland, O.
- Western Rotary Ventilator Co., Inc., Los Angeles, Cal.
- Wing Mfg. Co., L. J., New York City.

### VENTILATORS, ROOF, GRAVITY

- Accurate Mfg. Works, Chicago, Ill.
- Aeolus Dickinson, Chicago, Ill.
- Airtherm Mfg. Co., St. Louis, Mo.
- Allen Corp., Detroit, Mich.
- American Foundry & Furnace Co., Bloomington, Ill.
- American-Larson Ventilating Co., Pittsburgh, Pa.
- American Sheet Metal Works, New Orleans, La.
- Anderson Mfg. Co., Des Moines, Ia.
- Arex Co., Chicago, Ill.
- Berger Bros. Co., Philadelphia, Pa.
- Burt Mfg. Co., Akron, O.
- Century Fan & Ventilator Corp., New York City.
- Chicago Metal Mfg. Co., Chicago, Ill.
- Cincinnati Sheet Metal & Roofing Co., Cincinnati, O.
- Clay Equipment Corp., Cedar Falls, Ia.
- Danser Metal Works Co., Hagerstown, Md.
- Day Co., The, Minneapolis, Minn.
- Decatur Iron & Steel Co., Decatur, Ala.
- Edwards Mfg. Co., Inc., Cincinnati, O.
- Falstrom Co., Passaic, N. J.
- Fingles, Inc., W. A., Baltimore, Md.
- General Sheet Metal Works, Inc., Bridgeport, Conn.
- Globe Ventilator Co., Troy, N. Y.
- Goethel Co., Alfred C., Milwaukee, Wis.
- Hirschman Co., Inc., W. F., Buffalo, N. Y.
- Howes Co., S. M., Charlestown, Boston, Mass.
- Hudson Equipment Corp., Minneapolis, Minn.
- Industrial Sheet Metal Works, Inc., Detroit, Mich.
- International Steel Co., Evansville, Ind.
- Iona Ventilator Co., Inc., Philadelphia, Pa.
- Iwan Brothers, South Bend, Ind.
- Jamar Co., Walker, Duluth, Minn.
- Jordan & Co., Paul R., Indianapolis, Ind.
- Kernchen Co., Chicago, Ill.
- King Ventilating Co., Owatonna, Minn.
- Kleenaire Corp., Stevens Point, Wis.
- LaCrosse Steel Roofing & Corrugating Co., LaCrosse, Wis.
- Lamneck Products, Inc., Columbus, O.
- Lee & Son Co., Thomas, Cincinnati, O.
- Levow, David, New York City.
- Martin Metal Mfg. Co., Wichita, Kan.
- Mellish & Murray Co., Chicago, Ill.
- Merchant & Evans Co., Philadelphia, Pa.
- Meyer & Bro. Co., F., Peoria, Ill.
- Midwest Ventilating Works, Milwaukee, Wis.
- Milcor Steel Co., Milwaukee, Wis.
- Novy Ventilator Mfg. Co., Muskogee, Okla.
- Park City Cornice Works, Inc., Bridgeport, Conn.
- Penn Ventilating Co., Philadelphia, Pa.
- Perkins & Brown, Chicago, Ill.
- Providence Cornice Co., Providence, R. I.
- Puhl & Hepper Mfg. Co., Inc., St. Louis, Mo.
- Racine Sheet Metal Works, Racine, Wis.
- Robertson Co., H. H., Pittsburgh, Pa.
- Royal Ventilator Co., Philadelphia, Pa.
- Ryniker Sheet Metal Works, Inc., Billings, Mont.
- St. Paul Corrugating Co., St. Paul, Minn.
- Schoedinger Co., F. O., Columbus, O.
- Southbridge Roofing Co., Inc., Southbridge, Mass.
- Southern States Iron Roofing Co., Savannah, Ga.
- Standard Ventilator Co., Lewisburg, Pa.
- Sturtevant Co., B. F., Hyde Park, Boston, Mass.
- Swartwout Co., Cleveland, O.
- Tierney Rotor Ventilator Co., Minneapolis, Minn.
- Uno Ventilator Co., Cliftondale, Mass.
- Van Norden Co., E. Boston, Mass.

- Watson Co., Inc., Jas. H., Bradley, Ill.
- Western Rotary Ventilator Co., Inc., Los Angeles, Cal.
- Willis Mfg. Co., Galesburg, Ill.
- York Corrugating Co., York, Pa.

### WARM AIR REGISTER SHIELDS

*See Shields, Warm Air Register*

### WASHERS, AIR, FURNACE

- Air Conditioning Equipment Corp., Minneapolis, Minn.
- Aladdin Heating Corp., Oakland, Cal.
- American Furnace Co., St. Louis, Mo.
- Ames Co., W. R., San Francisco, Cal.
- Arcofeld Mfg. Co., Inc., Seattle, Wash.
- Belanger Fan & Blower Co., Detroit, Mich.
- Bishop & Babcock Sales Co., Cleveland, O.
- Brundage Co., Kalamazoo, Mich.
- Campbell Heating Co., Des Moines, Ia.
- Columbus Heating & Ventilating Co., Columbus, O.
- Economy Baler Co., Ann Arbor, Mich.
- Furblo Co., Hermansville, Mich.
- Gehrl Co., Tacoma, Wash.
- Green Foundry & Furnace Works, Des Moines, Ia.
- Hoerating & Holtmann Co., Dayton, O.
- Jackson & Church Co., Saginaw, Mich.
- Kelsey Heating Co., Syracuse, N. Y.
- LaCrosse Tractor Co., LaCrosse, Wis.
- Lau Blower Co., Dayton, O.
- MaGirl Foundry & Furnace Works, P. H., Bloomington, Ill.
- Meyer Furnace Co., Peoria, Ill.
- Mueller Furnace Co., L. J., Milwaukee, Wis.
- National Fan & Blower Corp., Subsidiary U. S. Air Conditioning Corp., Minneapolis, Minn.
- Pacific Gas Radiator Co., Los Angeles, Cal.
- Premier Furnace Co., Dowagiac, Mich.
- Round Oak Co., Dowagiac, Mich.
- Spencer Air Conditioning Service, Denver, Colo.
- Spray-Wheel Air Conditioners, Inc., Denver, Colo.
- Texo Sales & Mfg. Co., Cincinnati, O.
- U. S. Air Conditioning Corp., Minneapolis, Minn.
- Waterman-Waterbury Co., Minneapolis, Minn.
- Western Blower Co., Seattle, Wash.

### WASHERS, AIR, HEATING AND VENTILATING

(Capacity 4,000 c.f.m. and up)

- American Blower Corp., Detroit, Mich.
- American Foundry & Furnace Co., Bloomington, Ill.
- Ames Co., W. R., San Francisco, Cal.
- Autovent Fan & Blower Co., Chicago, Ill.
- Bayley Blower Co., Milwaukee, Wis.
- Belanger Fan & Blower Co., Detroit, Mich.
- Betz Unit Air Cooler Co., Kansas City, Mo.
- Bishop & Babcock Sales Co., Cleveland, O.
- Blower Application Co., Milwaukee, Wis.
- Bubar, Hudson H., New York City.
- Buffalo Forge Co., Buffalo, N. Y.
- Campbell Heating Co., E. K., Kansas City, Mo.
- Clarage Fan Co., Kalamazoo, Mich.
- Columbus Heating & Ventilating Co., Columbus, O.
- Electrogas Furnace & Mfg. Co., San Francisco, Cal.
- Electrovent Fan & Mfg. Co., Chicago, Ill.
- Furblo Co., Hermansville, Mich.
- Industrial Sheet Metal Works, Inc., Detroit, Mich.
- King Ventilating Co., Owatonna, Minn.
- MaGirl Foundry & Furnace Works, P. H., Bloomington, Ill.
- Mellish & Murray Co., Chicago, Ill.
- National Fan & Blower Corp., Subsidiary U. S. Air Conditioning Corp., Minneapolis, Minn.
- National Air Conditioning Engineering Corp., Kansas City, Mo.
- New York Blower Co., Chicago, Ill.
- Northern Blower Co., Cleveland, O.
- Pacific Gas Radiator Co., Los Angeles, Cal.
- Parks-Cramer Co., Fitchburg, Mass.
- Reliance Refrigeration Machine Co., Chicago, Ill.
- Spray-Wheel Air Conditioners, Inc., Denver, Colo.
- Sturtevant Co., B. F., Hyde Park, Boston, Mass.
- Supreme Heater & Ventilating Corp., St. Louis, Mo.
- Texo Sales & Mfg. Co., Cincinnati, O.
- Trane Co., La Crosse, Wis.
- U. S. Air Conditioning Corp., Minneapolis, Minn.
- Utica Radiator Corp., Utica, N. Y.
- Utility Fan & Mfg. Co., Los Angeles, Cal.
- Western Blower Co., Seattle, Wash.
- York Ice Machinery Corp., York, Pa.

### WATER CIRCULATING PUMPS

*See Pumps, Water Circulating*

### WATER COILS

*See Coils, Cooling Water*

**WATER-PROOFING COMPOUNDS***See Compounds, Water-proofing***WATER HEATERS***See Coils, Fire Pot, Hot Water***WEATHER STRIPS, METAL**

Accurate Metal Weather Strip Co., New York City.  
 Allmetal Weatherstrip Co., Chicago, Ill.  
 American Metal Weather Strip Co., Grand Rapids, Mich.  
 Athey Co., Chicago, Ill.  
 Burrowes Corp., Portland, Me.  
 Chamberlin Metal Weather Strip Co., Detroit, Mich.  
 Cincinnati Sheet Metal & Roofing Co., Cincinnati, O.  
 Diamond Metal Weather Strip Co., Columbus, O.  
 Ideal Metal Weather Strip Co., Boulder, Colo.  
 Jamar Co., Walker, Duluth, Minn.  
 Johnson Metal Products Co., Erie, Pa.  
 Kane Mfg. Corp., Kane, Pa.  
 Metal Products Co., Cincinnati, O.  
 Monarch Metal Weatherstrip Corp., St. Louis, Mo.  
 Newman Brothers, Inc., Cincinnati, O.  
 Northern Weatherstrip Co., Duluth, Minn.  
 Pacific States Felt & Mfg. Co., Inc., San Francisco, Cal.  
 Vento Steel Sash Co., Muskegon, Mich.  
 Yardley Screen & Weather Strip Co., Columbus, O.

**WELDERS, ARC**

Agnew Electric Welder Co., Milford, Mich.  
 Air Reduction Sales Co., New York City.  
 Alter-Arc Mfg. Co., Lawton, Okla.  
 Burke Electric Co., Erie, Pa.  
 Commonwealth Mfg. Corp., Cincinnati, O.  
 •Crise Electric Mfg. Co., Mt. Vernon, O.  
 •Eisler Engineering Co., Newark, N. J.  
 Electric Arc Cutting & Welding Co., Newark, N. J.  
 General Equipment Co., Wichita, Kan.  
 •General Electric Co., Schenectady, N. Y.  
 Giant Grip Mfg. Co., Oshkosh, Wis.  
 Hammett Mfg. Co., Kansas City, Mo. (A. C.)  
 Hampton Elec. Tool Co., Pittsburgh, Pa.  
 Harnischfeger Corp., Milwaukee, Wis.  
 Hobart Brothers Co., Troy, O.  
 Lee & Son Co., K. O., Aberdeen, S. D.  
 Lincoln Electric Co., Cleveland, O.  
 Maple Valley Mfg. Co., Mapleton, Ia.  
 Marquette Mfg. Co., Inc., Minneapolis, Minn.  
 Master Welders, Kansas City, Mo. (A.C.)  
 Micro Products Co., Peoria, Ill.  
 Miller Electric Mfg. Co., Appleton, Wis. (Portable)  
 Ohio Welder Co., Middlefield, O.  
 Owen-Dyneto Corp., Syracuse, N. Y.  
 Pier Equipment Manufacturing Co., Benton Harbor, Mich.  
 Star Electric Motor Co., Bloomfield, N. J.  
 Tatro Brothers, Inc., Decorah, Ia.  
 Thomson-Gibb Electric Welding Co., Lynn, Mass.  
 Una Welding, Inc., Cleveland, O.  
 Universal Power Corp., Cleveland, O.  
 Vulcan Elec. Mfg. Co., St. Louis, Mo.  
 Weldex, Inc., Detroit, Mich.  
 Welding Apparatus Co., Chicago, Ill.  
 Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.  
 Will-Weld Mfg. Co., Inc., Omaha, Nebr. (A.C.)  
 Wilson Welder & Metals Co., Inc., North Bergen, N. J.

**WELDERS, SPOT**

•Acme Electric Welder Co., Huntington Park, Cal.  
 Commonwealth Mfg. Corp., Cincinnati, O.  
 •Eisler Engineering Co., Newark, N. J.  
 Electric Arc Cutting & Welding Co., Newark, N. J.  
 Federal Machine & Welder Co., Warren, O.  
 •General Electric Co., Schenectady, N. Y.  
 Glascock Bros. Mfg. Co., Muncie, Ind.  
 Hammett Manufacturing Co., Kansas City, Mo. (Portable)  
 Micro Products Co., Peoria, Ill.  
 Pier Equipment Manufacturing Co., Benton Harbor, Mich.  
 (Foot operated and motor driven)  
 Steen-Dyer Mfg. Co., Kansas City, Mo.  
 Taylor-Hall Welding Corp., Worcester, Mass.  
 Taylor-Winfield Corp., Warren, O. (Butt and Seam)  
 Thomson-Gibb Electric Welding Co., Lynn, Mass.

**WELDING EQUIPMENT, OXY-ACETYLENE**

Air Reduction Sales Co., New York City.  
 •Automatic Gasflux Co., Cleveland, O.  
 Bastian-Blessing Co., Chicago, Ill.  
 Burdett Mfg. Co., Chicago, Ill.

Carbo-Oxygen Co., Pittsburgh, Pa.  
 Gasweld & Airway, Inc., Chicago, Ill.  
 Harris Calorific Co., Cleveland, O.  
 Imperial Brass Mfg. Co., Chicago, Ill.  
 Linde Air Products Co., New York City.  
 Milburn Co., Alexander, Baltimore, Md.  
 Sight Feed Generator Co., Richmond, Ind.  
 Smith Welding Equipment Corp., Minneapolis, Minn.  
 Torchweld Equipment Co., Chicago, Ill.  
 Victor Equipment Co., Los Angeles, Cal.  
 Welding Apparatus Co., Chicago, Ill.

**WELDING ROD***See Rod, Welding***WELDING TORCHES***See Torches, Brazing, Cutting, Welding***WHEELS, BLOWER**

Advance Aluminum Castings Corp., Chicago, Ill.  
 •Air Controls, Inc., Cleveland, O.  
 American Blower Corp., Detroit, Mich.  
 Autovent Fan & Blower Co., Chicago, Ill.  
 Bayley Blower Co., Milwaukee, Wis.  
 •Buffalo Forge Co., Buffalo, N. Y.  
 Champion Blower & Forge Co., Lancaster, Pa.  
 •Clarage Fan Co., Kalamazoo, Mich.  
 Economy Electric Manufacturing Co., Cicero, Ill.  
 •Furblo Co., Hermansville, Mich.  
 •Jaden Mfg. Co., Inc., F., Hastings, Nebr.  
 Janette Mfg. Co., Chicago, Ill.  
 •Lau Blower Co., Dayton, O.  
 National Fan & Blower Corp., Subsidiary U. S. Air Conditioning Corp., Minneapolis, Minn.  
 •Schwitzer-Cummins Co., Indianapolis, Ind.  
 Sturtevant Co., B. F., Hyde Park, Boston, Mass.  
 Torrington Mfg. Co., Torrington, Conn.  
 •U. S. Air Conditioning Corp., Minneapolis, Minn.  
 •Utility Fan & Mfg. Co., Los Angeles, Cal.  
 Viking Air Conditioning Corp., Cleveland, O.

**WINDOW VENTILATOR-FILTER UNITS***See Units, Window Ventilator and Filter***WINDOWS, HOLLOW METAL**

American Sheet Metal Works, New Orleans, La.  
 Berger Mfg. Co., Div. of Republic Steel Corp., Canton, O.  
 Biersach & Neidermeyer Co., Milwaukee, Wis.  
 Falstrom Co., Passaic, N. J.  
 Herrmann & Grace Co., Brooklyn, N. Y.  
 International Steel Co., Evansville, Ind.  
 Newman Brothers, Inc., Cincinnati, O.  
 Perkinson & Brown, Chicago, Ill.  
 Providence Cornice Co., Providence, R. I.  
 Russell Insulation Co., F. G., Baltimore, Md.  
 Truscon Steel Co., Youngstown, O.  
 Willis Mfg. Co., Galesburg, Ill.

**WIRE, PLAIN, GALVANIZED AND COPPERED**

Allegheny Steel Co., Brackenridge, Pa. (Stainless).  
 Aluminum Co. of America, Pittsburgh, Pa. (Aluminum).  
 American Nickeloid Co., Peru, Ill. (Chrome, nickel coated).  
 American Steel & Wire Co., Chicago, Ill.  
 Bethlehem Steel Co., Bethlehem, Pa. (Plain, galvanized).  
 California Wire Cloth Co., Oakland, Cal. (Cloth).  
 Central Steel & Wire Co., Chicago, Ill.  
 Chase Brass & Copper Co., Inc., Waterbury, Conn.  
 Chicago Steel & Wire Co., Chicago, Ill.  
 Columbia Steel Co., San Francisco, Cal.  
 Continental Steel Corp., Kokomo, Ind. (Plain, galvanized steel)  
 Copperweld Steel Co., Glassport, Pa. (Copper covered steel).  
 Gulf States Steel Co., Birmingham, Ala.  
 Jones & Laughlin Steel Corp., Pittsburgh, Pa.  
 Ludlow-Saylor Wire Co., St. Louis, Mo. (Cloth).  
 Page Steel & Wire Co., Monessen, Pa.  
 •Republic Steel Corp., Cleveland, O. (Steel).  
 Roebing's Sons Co., John A., Trenton, N. J.  
 Tennessee Coal, Iron & Railroad Co., Birmingham, Ala.  
 Townsend Co., New Brighton, Pa. (Plain and coppered).  
 Western Wire & Iron Works, Inc., Chicago, Ill.  
 Wheeling Metal & Mfg. Co., Wheeling, W. Va.  
 Wickwire Spencer Steel Co., New York City.  
 •Youngstown Sheet & Tube Co., Youngstown, O.



Section of  
**American Artisan**  
 1938 DIRECTORY OF WARM AIR HEATING, RESIDENTIAL  
 AIR CONDITIONING AND SHEET METAL PRODUCTS  
 [Section 2—TRADE NAMES]

**A**

- ABC**—Fan Bearings, Ventilators. American Blower Corp., Detroit, Mich.
- ABC**—Oil Burners. Automatic Burner Corp., Chicago, Ill.
- AC**—Bearings, Blowers, Blower Wheels. Air Controls, Inc., Cleveland, O.
- A-C-E**—Furnace Blowers. Utility Fan & Mfg. Co., Los Angeles, Cal.
- AGF**—Air Conditioning Furnaces and Gas Conversion Burners. American Gas Products Corp., New York City.
- A-F**—Humidistats, Regulators, Thermostats, Valves, Automatic Products Co., Milwaukee, Wis.
- Able**—Waterproofing Compounds. American Barlock Co., Inc., Long Island City, N. Y.
- Abrasoweld**—Arc Welding Electrodes. Lincoln Electric Co., Cleveland, O.
- Acco-Lastic**—Caulking Compounds. Accurate Metal Weather Strip Co., New York, N. Y.
- Ace**—Arc and Spot Welders. Pier Equipment Mfg. Co., Benton Harbor, Mich.
- Acidseal**—Paint. B. F. Goodrich Co., Akron, O.
- Acofin**—Air Conditioning Units, Collis. Airecon Industries, Inc., Detroit.
- Acousti-Pad**—Insulation. Burgess Battery Co., Chicago, Ill.
- Action Air**—Blowers. Brown Corp., Syracuse, N. Y.
- Adams**—Dampers, Jas. H. Watson Co., Inc., Bradley, Ill.
- Aeracool**—Fan Blades, Fans, Louvres, Ventilators. Myers Electric Co., Pittsburgh, Pa.
- Aerotherm**—Thermostats. Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
- Aerocrat**—Air Conditioning Units, Blowers and Blower Units, Fans, Furnaces, Washers. W. R. Ames Co., San Francisco, Cal.
- Aeropel**—Kitchen Exhaust Fans. American Blower Corp., Detroit, Mich.
- Aeroplane**—Ventilators. Paul R. Jordan & Co., Indianapolis, Ind.
- Aeroplex**—Blowers. Bayley Blower Co., Milwaukee, Wis.
- Aeropull**—Ventilators. Paul R. Jordan & Co., Indianapolis, Ind.
- Aerovolve**—Ventilators. Knowles Mushroom Ventilator Co., New York, N. Y.
- Afco**—Furnaces. American Furnace Co., St. Louis, Mo.
- Afco**—Dampers, Grilles, Louvres, Quadrants, Registers. American Foundry & Furnace Co., Bloomington, Ill.
- Agathon**—Plates and Sheets. Republic Steel Corp., Cleveland, O.
- Air-Acoustic**—Insulation. Johns-Manville, New York City.
- Airco**—Electrodes and Welding Rods. Air Reduction Sales Co., New York.
- Airco-DE**—Welding Equipment. Air Reduction Sales Co., New York, N. Y.
- Aire-Ray-Ator**—Air Conditioning Oil-Burning Furnaces. Ray Oil Burner Co., San Francisco, Cal.
- Airex**—Ventilating Fans, Blowers. Mountain States Equipment Co., Denver, Colo.
- Air-Flo**—Dampers and Ventilators. Belanger Fan & Blower Co., Detroit.
- Aire-Flo**—Air Conditioning Units, Blower Units. Lennox Furnace Co., Marshalltown, Iowa.
- Airflo**—Furnaces. Aladdin Heating Corp., Oakland, Cal.
- Airfoil**—Fans and Fan Blades. Aerovent Fan Co., Piqua, O.
- Airguide**—Thermometers. Fee & Stemwedel, Inc., Chicago, Ill.
- Airite**—Furnaces. Trane Co., La Crosse, Wis.
- Airklenzer**—Furnace Air Conditioning Unit. Round Oak Co., Dowagiac, Mich.
- Airline**—Furnaces. Joliet Heating Corp., Joliet, Ill.
- Airline**—Registers & Grilles. Tuttle & Bailey, Inc., New Britain, Conn.
- Air-Marvals**—Attic Fans. General Blower Co., Philadelphia, Pa.
- Airmaster**—Air Conditioning Units. Thatcher Co., Newark, N. J.
- Air-Master**—Grilles. Waterloo Register Co., Waterloo, Ia.
- Airmat**—Filters. American Air Filter Co., Inc., Louisville, Ky.
- Airnoil**—Oil Burners. American Oil Burners & Heating Utilities, Brooklyn, N. Y.
- Air-O-Matic**—Air Conditioning System, Boiler Type, Williams Oil-O-Matic Heating Corp., Bloomington, Ill.
- Air-O-Mist**—Humidifiers. Sallada Mfg. Co., Minneapolis, Minn.
- Airplex**—Filters. Davies Air Filter Corp., New York, N. Y.
- Airpyrator**—Blowers. Burnwell Corp., Allentown, Pa.
- Airseal**—Insulation. Rock Wool Products Co., Inc., Wabash, Ind.
- Airvulo**—Concrete Waterproofing Paint. Self-Vulcanizing Rubber Co., Inc., Chicago, Ill.
- Ajax**—Pipe, Roofing. Cincinnati Sheet Metal & Roofing Co., Cincinnati, O.
- Alabama**—Ventilators. Decatur Iron & Steel Co., Decatur, Ala.
- Alaska**—Collis. Star Radiator Co., Los Angeles, Cal.
- Albron**—Aluminum Paint. Aluminum Co. of America, Pittsburgh, Pa.
- Alco**—Roof Ventilators. Allen Corp., Detroit, Mich.
- Alcoa**—Aluminum Products. Aluminum Company of America, Pittsburgh.
- Algias**—Skylights. American Barlock Co., Inc., Long Island City, N. Y.
- Aladdin**—Arc Welders. Commonwealth Mfg. Corp., Cincinnati, O.
- All American**—Cabinet Heaters. Hayes Custer Stove Co., Bloomington, Ill.
- Allegheny**—Air Conditioning Furnaces. Pittsburgh Furnace Parts Co., Pittsburgh, Pa.
- All-Season**—Directional Flow Register. Eckenroth Register Co., San Francisco, Cal.
- All-Year-Air**—Air Conditioning Units. Auburn Automobile Co., Air Conditioning Div., Chicago, Ill.
- Almar**—Corner Lock Forming Machine. Ward Machinery Co., Chicago, Ill.
- Almetal**—Fire Doors. Merchant & Evans Co., Philadelphia, Pa.
- Alnor**—Thermometers. Illinois Testing Laboratories, Inc., Chicago, Ill.
- Alumbrite**—Paint. Thompson & Co., Pittsburgh, Pa.
- Alumilite**—Aluminum Venetian Blinds. Chicago Venetian Blind Co., Chicago.
- Aluminweld**—Arc Welding Electrodes. Lincoln Electric Co., Cleveland, O.
- Always Reliable**—Soldering Furnaces, Torches. Otto Berns Co., Inc., Rochester, N. Y.
- Ambrac**—Sheets, Welding Rod. American Brass Co., Waterbury, Conn.
- Amco**—Flux. American Solder & Flux Co., Philadelphia, Pa.
- Amco**—Nozzles. Grinnell Co., Inc., Providence, R. I.
- American**—Draft Gages. Consolidated Ashcroft Hancock Co., Inc., Bridgeport, Conn.
- American**—Furnaces. Ryniker Sheet Metal Works, Inc., Billings, Mont.
- American**—Smoke Pipe Dampers. Griswold Mfg. Co., Erie, Pa.
- American**—Temperature Recorders. Manning, Maxwell & Moore, Inc., Bridgeport, Conn.
- Amirglass**—Air Filters. Amirton Co., New York City.
- Am-Fe-Co**—Blower Units. American Machine Products Co., Marshalltown, Iowa.
- Anaconda**—Copper and Brass Products. American Brass Co., Waterbury, Conn.
- Anchor**—Air Conditioning Units and Furnaces, Oil Burners. Fargo Foundry Co., Fargo, N. D.
- Anchor**—Roofing Nails. W. H. Maze Co., Peru, Ill.
- Anchor**—Roofing Paint. A. Wilhelm Co., Reading, Pa.
- Anchor Brand**—Nails, Rivets. Townsend Co., New Brighton, Pa.
- Anderson**—Spray Nozzles. B. F. Sturtevant Co., Hyde Park, Mass.
- Anode**—Arc Welding Electrodes. Lincoln Electric Co., Cleveland, O.
- Anti-Fluvius**—Skylights. G. Drouve Co., Fairfield, Conn.
- Apco**—Caulking Compounds, Roofing Paint. Asphalt Products Co., Syracuse, N. Y.
- Apex**—Dampers, Quadrants. Ohio Products Co., Cleveland, O.
- Apex**—Hangers, Elbows and Fittings. Royal-Apex Mfg. Corp., Brooklyn.



**Apollo**—Roofing. Carnegie-Illinois Steel Co., Pittsburgh, Pa.  
**Appoloy**—Copper Steel. Apollo Steel Company, Apollo, Pa.  
**Aqua Bar**—Furnace Cement. Continental Products Co., Euclid, O.  
**Arc-Eng**—Air Conditioning Registers. Register & Grille Mfg. Co., Inc., Brooklyn, N. Y.  
**Arco**—Air Conditioning Units, Air Filters, Cleaners. American Radiator Co., New York, N. Y.  
**Arco-Vecto**—Heaters. American Radiator Co., New York, N. Y.  
**Arin**—Louvers. Arex Co., Chicago, Ill.  
**Aristocrat**—Fans. Torrington Mfg. Co., Torrington, Conn.  
**Aristocrat**—Registers. Auer Register Co., Cleveland, O.  
**Armco**—Plates, Sheets. American Rolling Mill Co., Middletown, O.  
**Armorise**—Paint. Carter Paint Co., Liberty, Ind.  
**Arrow**—Ventilators. Uno Ventilator Co., Cliftondale, Mass.  
**Art**—Shingles. Cincinnati Sheet Metal & Roofing Co., Cincinnati, O.  
**Art**—Faces. Wooster Art Wood, Inc., Wooster, O.  
**Artcraft**—Furnace Blowers. Chicago Steel Furnace Co., Chicago, Ill.  
**Asco**—Relays, Switches, Valves. Automatic Switch Co., New York, N. Y.  
**Aspro**—Water - proofing Paint. Asphalt Products Co., Syracuse, N. Y.  
**Atomist**—Humidifiers. American Foundry & Furnace Co., Bloomington, Ill.  
**Automatic Butler**—Stokers. Butler Mfg. Co., Kansas City, Mo.  
**Automatic Drip**—Humidifiers. Automatic Humidifier Co., Cedar Falls, Iowa.  
**Automatic June**—Humidifiers, Valves. Monmouth Products Co., Cleveland.  
**Automatic Water-Tender**—Humidifier Valves. Air Conditioning Supply Co., Cleveland, Ohio.  
**Automatik**—Furnaces. Premier Furnace Co., Dowagiac, Mich.

## B

**BB**—Fittings and Accessories. Berger Bros. Co., Philadelphia, Pa.  
**BC**—Closet-Type Gas-Fired Air Conditioning Unit. Surface Combustion Corp., Toledo, Ohio.  
**B-W**—Relays, Switches. Bender Warrick Corp., Birmingham, Mich.  
**Badger**—Machines, Metal Workers' Tools, Pumps. Rock River Machine Co., Inc., Janesville, Wis.  
**Ball Bearing**—Dampers Quadrants. Parker-Kalon Corp., New York, N. Y.  
**Balmi-Aire**—Air Conditioning Units. U. S. Air Conditioning Corp., Minneapolis, Minn.  
**Bankheat**—Oil Burners. S. T. Johnson Co., Oakland, Cal.  
**Barcol**—Motors. Barber Colman Co., Rockford, Ill.  
**Barry**—Couplings, Pulleys. R. & J. Dick Co., Inc., Passaic, N. J.  
**Barton**—Gas and Oil Burners, Air Conditioning and Gravity Furnaces. National Mfg. & Engineering Co., Detroit, Mich.  
**Beaver**—Insulation. Certain-teed Products Corp., New York, N. Y.  
**Beehive**—Roofing. Samuel Cabot, Inc., Boston, Mass.  
**Beloit**—Machines, Punches, Tools. Hendley & Whittemore Co., Beloit, Wis.  
**Benco**—Oil Burners. W. M. Bennett Corp., Omaha, Nebr.  
**Benefactor**—Furnaces. Hess Warming & Ventilating Co., Chicago, Ill.  
**Bengal**—Furnaces, Heaters. Floyd-Wells Co., Royersford, Pa.  
**Bennett-Allison**—Oil Burners. W. M. Bennett Corp., Omaha, Nebr.

**Berloy**—Building Products. Berger Mfg. Co., Div. Republic Steel Corp., Canton, O.  
**Bertossa**—Air Conditioning and Warm Air Furnaces. Jackson & Church Co., Saginaw, Mich.  
**Beth-Cu-Loy**—Sheets. Bethlehem Steel Co., Bethlehem, Pa.  
**Bettendorf**—Oil Burners. Micro-Westco, Inc., Bettendorf, Iowa.  
**Big Sioux**—Furnaces. Iowa Foundry Co., Sioux City, Iowa.  
**Bildrite**—Building Insulation. Insulite Co., Minneapolis, Minn.  
**Black Diamond**—Built-up Roofing. Barrett Co., New York, N. Y.  
**Black Diamond**—Furnaces, Heaters. Maple City Furnace Co., Monmouth, Ill.  
**Bio-Matic**—Stokers. Her-Born Engineering & Mfg. Co., Sandusky, O.  
**Blue Streak**—Blowers, Heaters, Humidifiers, Washers. Western Blower Co., Seattle, Wash.  
**Boiler Plate**—Furnaces. Williamson Heater Co., Cincinnati, O.  
**Bon-Air**—Air Conditioning Units, Blower Units, Furnaces. Rudy Furnace Co., Dowagiac, Mich.  
**Boomer**—Furnaces, Heaters. Hess-Snyder Co., Massillon, O.  
**Braden-Everedy**—Furnaces, Oil Burners, Air Conditioning Units, Oil Burner Builders, Inc., Bellevue, Ia.  
**Branford**—Oil Burners. Malleable Iron Fittings Co., Branford, Conn.  
**Breez-Air**—Fans. Buffalo Forge Co., Buffalo, N. Y.  
**Brevolite**—Crackle Finish Paint. Zapon-Brevolite Division Atlas Powder Co., North Chicago, Ill.  
**Brookseil**—Metal Ceilings. Brooklyn Metal Ceiling Co., Brooklyn, N. Y.  
**Browne**—Furnaces, Oil Burners. Phillips Heating, Ventilating & Mfg. Co., Los Angeles, Cal.  
**Bull Dog**—Snips and Shears. Wiss & Sons Co., Newark, N. J.  
**Bung-Lo**—Floor and Warm Air Furnaces. Geo. J. Cocking, Santa Ana, Cal.  
**Burke**—Pumps. Decatur Pump Co., Decatur, Ill.  
**Burmester**—Furnaces, Oil Burners. Hotentot Co., Inc., Omaha, Nebr.  
**Butler**—Furnaces. Ramey Mfg. Co., Columbus, O.

## C

**C-E**—Stokers. Combustion Engineering Co., Inc., New York, N. Y.  
**C-E Coxe**—Stokers. Combustion Engineering Co., Inc., New York City.  
**C-E Stelly**—Stokers. Combustion Engineering Co., Inc., New York City.  
**C-H**—Relays, Switches and Valves. Cutler-Hammer, Inc., Milwaukee, Wis.  
**CID**—Pumps. Goulds Pumps, Inc., Seneca Falls, N. Y.  
**Cadet**—Cabinet Heaters. Independence Stove & Furnace Co., Independence, Mo.  
**Calliflex**—Thermostatic Bi-Metals. Callite Product Co., Union City, N. J.  
**Calorider**—Humidifiers. Research Corp., New York, N. Y.  
**Calwico**—Wire Cloth California Wire Cloth Co., Oakland, Cal.  
**Camel**—Valves. C. L. Bryant Corp., Cleveland, O.  
**Capital**—Furnaces, Heaters. Farris Furnace Co., Springfield, Ill.  
**Capitol**—Air Conditioning Units, Furnaces. United States Radiator Corp., Detroit, Mich.  
**Capitol**—Insulation. Standard Lime & Stone Co., Baltimore, Md.  
**Capitol**—Weather Strips. Diamond Metal Weather Strip Co., Columbus, O.

**Carola**—Heaters. Cary Mfg. Co., Wau-paca, Wis.  
**Case-Schaffer**—Furnaces. Western Furnaces, Inc., Tacoma, Wash.  
**Castalu**—Blower Wheels. Advance Aluminum Castings Corp., Chicago, Ill.  
**Caulk-O-Seal**—Caulking and Glazing Compounds. Calbar Paint & Varnish Co., Philadelphia, Pa.  
**Cel-Lux**—Insulation. Norristown Magnesia & Asbestos Co., Norristown, Pa.  
**Cementite**—Paint. Thompson & Co., Pittsburgh, Pa.  
**Cementkote**—Paint. Tropical Paint & Oil Co., Cleveland, O.  
**Cempro**—Concrete Paint. Asphalt Products Co., Syracuse, N. Y.  
**Challenge**—Furnaces. Standard Foundry & Furnace Co., DeKalb, Ill.  
**Chamberlin**—Automatic Humidifier. Chandler Co., Cedar Rapids, Ia.  
**Charavay**—Blowers, Fans. Hartzell Propeller Fan Co., Piqua, O.  
**Chicago**—Brakes and Presses. Dreis & Krump Mfg. Co., Chicago, Ill.  
**Chicastic Castable**—Refractory. Chicago Fire Brick Co., Chicago, Ill.  
**Chico Brickset**—High Temperature Cement. Chicago Fire Brick Co., Chicago, Ill.  
**Chief**—Furnaces. Joliet Heating Corp., Joliet, Ill.  
**Chieftain**—Cabinet Heaters. Independence Stove & Furnace Co., Independence, Mo.  
**Chieftain**—Refrigerating Compressors. Tecumseh Products Co., Tecumseh, Mich.  
**Chinook**—Heating Coils. Bayley Blower Co., Milwaukee, Wis.  
**Chinookfan**—Heating Coils. Bayley Blower Co., Milwaukee, Wis.  
**Christie**—Furnace Vacuum Cleaners. Cincinnati Sheet Metal & Roofing Co., Cincinnati, O.  
**Chromweld**—Arc Welding Electrodes. Lincoln Electric Co., Cleveland, O.  
**Chronat**—Furnace and Boiler Repairs. National Fdry. & Furnace Co., Dayton, O.  
**Chronotherm**—Thermostats. Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.  
**Cibulas**—Skylights, Ventilators. General Sheet Metal Works, Inc., Bridgeport, Conn.  
**CircOOLator**—Fans and Ventilators. Viking Air Conditioning Corporation, Cleveland, O.  
**Clamp On**—Humidifier Fittings. Sallada Mfg. Co., Minneapolis, Minn.  
**Classic**—Registers. Auer Register Co., Cleveland, O.  
**Cleanaire**—Blower - Filters. Peerless Foundry Co., Indianapolis, Ind.  
**Climate-Changer**—Air Conditioning Furnaces, Air Conditioning Units. Trane Co., LaCrosse, Wis.  
**Climate Maker**—Air Conditioning Units, Furnaces. American Foundry & Furnace Co., Bloomington, Ill.  
**Climate Master**—Oil Burning Air Conditioning Furnace. Hess Warming & Ventilating Co., Chicago, Ill.  
**Climator**—Air Conditioning Units, Blower Units, Washers. L. J. Mueller Furnace Co., Milwaukee.  
**Clinton**—Grilles. Wickwire Spencer Steel Co., New York City.  
**Coal Master**—Stoker-fired Furnace. Round Oak Co., Dowagiac, Mich.  
**Colalloy**—Non-Ferrous semi-rigid tubing. Colonial Stove Co., Philadelphia, Pa.  
**Colonial**—Blower-Filter Furnaces. Green Foundry & Furnace Works, Des Moines, Iowa.  
**Colonial**—Conductor Heads and Fittings. Royal-Apex Mfg. Corp., Brooklyn.

**Colonial**—Registers. Auer Register Co., Cleveland, O.

**Colortipt**—Arc Welding Electrodes. Wilson Welder & Metals Co., Inc., North Bergen, N. J.

**Columbus**—Ventilators. F. O. Schoedinger Co., Columbus, O.

**Combustioneer**—Stokers. Steel Products Engineering Co., Springfield, O.

**Comet**—Fans, Ventilators. New York Blower Co., Chicago, Ill.

**Comfort**—Furnaces. J. B. Foote Foundry Co., Fredericktown, O.

**Comfort**—Furnaces. Standard Furnace & Supply Co., Omaha, Nebr.

**Comfortaire**—Air Conditioning Units. Joliet Heating Corp., Joliet, Ill.

**Comfortaire**—Stokers. Hamilton Automatic Stoker Corp., Hamilton, O.

**Comfortmaker**—Air Conditioning Units, Furnaces. Joliet Heating Corp., Joliet, Ill.

**Comfort Master**—Air Conditioning Units. Thatcher Co., Newark, N. J.

**Comfortrol**—Air Conditioning Units, Blowers and Blower Units, Furnaces, Humidifiers, Washers. Waterman-Waterbury Co., Minneapolis.

**Comfortrol**—Effective Temperature Control. Julien P. Friez & Sons, Inc., Baltimore, Md.

**Compact**—Air Conditioning Units, Blowers. Bishop & Babcock Sales Co., Cleveland, O.

**Compact**—Oil Burners. The Aldrich Co., Peoria, Ill.

**Compass**—Belts. Goodyear Tire & Rubber Co., Akron, O.

**Condor**—Belts. Manhattan Rubber Mfg. Div. of Raybestos-Manhattan, Inc., Passaic, N. J.

**Controlaire**—Furnaces. "Home Comfort" Furnace & Mfg. Co., St. Louis, Mo.

**Control-O-Gas**—Valves. Payne Furnace & Supply Co., Beverly Hills, Cal.

**Convector**—Furnace. L. J. Mueller Furnace Co., Milwaukee, Wis.

**Coolair**—Blowers, Fans. American Coolair Corp., Jacksonville, Fla.

**Coppercote**—Copper Paint. American Coppercote, Inc., Brooklyn, N. Y.

**Copperior**—Sheets. Superior Sheet Steel Co., Canton, O.

**Cop-R-Loy**—Copper Bearing Steel Sheets. Wheeling Steel Corp., Wheeling, W. Va.

**Corinco**—Insulation. Cork Insulation Co., Inc., New York, N. Y.

**Corkboard**—Duct Insulation. Armstrong Cork Products Co., Lancaster, Pa.

**Coroaire**—Air Conditioning Furnaces and Heaters. Corozone Air Conditioning Corp., Cleveland, O.

**Crawford**—Furnaces. Walker & Pratt Mfg. Co., Boston, Mass.

**Crescent**—Gas-fired Conditioners and Furnaces. Green Foundry & Furnace Works, Des Moines, Iowa.

**Crescent**—Oil Burners. Caloroll Burner Corp., Hartford, Conn.

**Crescent**—Skylights, Ventilators. American Sheet Metal Works, New Orleans, La.

**Crescent**—Ventilators. F. Meyer & Bro. Co., Peoria, Ill.

**Crimpedge**—Eaves Trough, Gutters. Milcor Steel Co., Milwaukee, Wis.

**D**

**D&E**—Vacuum Furnace Cleaners, Stokers, Thermostats. Dickson & Eddy, New York City.

**D-Q**—Furnace Vacuum Cleaners. Densmore-Quinlan Co., Kenosha, Wis.

**Dadco**—Automatic Damper. Dutcher Heating Co., Canton, Mass.

**Dallaire**—Air Conditioning Units, Blowers and Blower Units, Furnaces. Dall Steel Products Co., Lansing, Mich.

**Dakota**—Air Conditioning Units and Furnaces, Blowers. Fargo Foundry Co., Fargo, N. D.

**Daptoblu**—Gas Burners. Beck Engineering Combustion Company, St. Louis.

**Dayton**—Air Conditioning Units. International Engineering, Inc., Dayton.

**Defecto**—Ventilators. The Day Co., Minneapolis, Minn.

**DeLuxe**—Air Conditioning Furnaces. Williamson Heater Co., Cincinnati.

**DeLuxe**—Ozonizers. Corozone Air Conditioning Corp., Cleveland, O.

**Dens-Pac**—Asbestos Cement. Norristown Magnesite & Asbestos Co., Norristown, Pa.

**Dependable**—Paint. Heath & Milligan Mfg. Co., Chicago, Ill.

**Dial Damper**—Draft Regulators. Parker-Kalon Corp., New York City.

**Diamond**—Compounds. Thompson & Co., Pittsburgh, Pa.

**Diamond**—Smoke Pipe Dampers. Adams Co., Dubuque, Ia.

**Diamond H**—Relays, Switches, Thermostats. Hart Mfg. Co., Hartford, Conn.

**Dickbelt**—Flat Belts. R. & J. Dick Co., Passaic, N. J.

**Dickinson**—Dampers, Scuppers, Ventilators. Aeolus Dickinson, Chicago, Ill.

**Dickrops**—V-type Belts. R. & J. Dick Co., Passaic, N. J.

**Directaire**—Air Conditioning Furnaces. Fitzgibbons Boiler Co., Inc., New York City.

**Doe**—Oil Burners. Bethlehem Foundry & Machine Co., Bethlehem, Pa.

**Donmore**—Oil Burners. Columbus Metal Products, Inc., Columbus, Ohio.

**Double Diamond**—Humidistats, Psychrometers, Humidity and Temperature Recorders, Relays, Switches, Thermometers. H-B Instrument Company, Philadelphia, Pa.

**Double Duty**—Filters. Independent Air Filter Co., Chicago, Ill.

**Double Duty**—Oil Burners. Aldrich Co., Peoria, Ill.

**Double Radiator**—Furnaces. Mueller Furnace Co., L. J., Milwaukee, Wis.

**Dover**—Hangers. Reeves Steel & Mfg. Co., Dover, Ohio.

**Dover-Imperial**—Eaves Trough Hangers. Ohio Wire Products Co., Dover, O.

**Dow**—Pipe. Sterling Foundry Co., Sterling, Ill.

**Dowaglac**—Furnaces. Rudy Furnace Co., Dowaglac, Mich.

**Draftmaster**—Regulators. Platt Products Corp., Lansing, Mich.

**Draftster**—Draft Gages. Cole-Sullivan Engineering Co., Minneapolis, Minn.

**Draft-O-Stat**—Draft Regulators. Hotstream Heater Company, Cleveland.

**Dreadnaught**—Soldering Furnaces, Torches. P. Wall Mfg. Supply Co., Pittsburgh, Pa.

**Dridrum**—Filters. American Air Filter Co., Inc., Louisville, Ky.

**Drifilter**—Filters. American Air Filter Co., Inc., Louisville, Ky.

**Dri-Lap**—Roofing. Globe Iron Roofing & Corrugating Co., Cincinnati, O.

**Dri-N-Tite**—Cement. A. C. Horn Co., Long Island City, N. Y.

**Drou-Ve-Lite**—Skylights. G. Drouve Co., Fairfield, Conn.

**Dual-Air**—Ventilators. General Regulator Corp., Chicago, Ill.

**Dual Control**—Portable Welders. Miller Electric Mfg. Co., Appleton, Wis.

**Dualator**—Air Conditioning Units. Bryant Heater Co., Cleveland, O.

**Dul-Kote**—Sheets. Tennessee Coal, Iron & Railroad Co., Birmingham, Ala.

**Dunco**—Relays, Switches, Thermostats and Timers. Struthers Dunn, Inc., Philadelphia, Pa.

**Duotherm**—Air Conditioning Units. Clarage Fan Co., Kalamazoo, Mich.

**Duo-Therm**—Cabinet Heaters, Oil Burners, Furnaces. Motor Wheel Corp., Lansing, Mich.

**Duplex**—Flashings. Chase Brass & Copper Co., Inc., Waterbury, Conn.

**Duplex**—Furnace Vacuum Cleaners. Ramey Mfg. Co., Columbus, O.

**Dura**—Furnaces, Heaters. Barry Furnace Co., Hamilton, O.

**DuraBilt**—Floor Registers and Cold Air Faces. Auer Register Co., Cleveland, Ohio.

**Dur-A-Ble**—Furnaces. "Home Comfort" Furnace & Mfg. Co., St. Louis, Mo.

**Durimet**—Sheets. Duriron Co. Inc., Dayton, O.

**Duronze**—Sheets. Bridgeport Brass Co., Bridgeport, Conn.

**DustStop**—Filters. Owens-Illinois Glass Co., Toledo, O.

**Dux-Bac**—Shingles. Milcor Steel Co., Milwaukee, Wis.

**Dux-Sulation**—Insulation, Duct and Sound Deadening. Grant Wilson, Inc., Chicago, Ill.

**Dwedox**—Welding Rod. Central Steel & Wire Co., Chicago, Ill.

## E

**E-E-Hung**—Eaves Trough. Jas. H. Watson Co., Inc., Bradley, Ill.

**Eagle**—Air Filters, Duct Insulation. Felters Co., Inc., Boston.

**Earle**—Ventilators. Berger Bros. Co., Philadelphia, Pa.

**Easy Edger**—Flanging Machine. Ward Machinery Co., Chicago, Ill.

**Easy-Flu**—Welding Rod. Handy & Harmon, New York, N. Y.

**Easy-Slip**—Eaves Trough and Gutters. La Crosse Steel Roofing & Corrugating Co., La Crosse, Wis.

**Econo-O-Miser**—Oil Burners. Syncro-Flame Burner Corp., Hartford, Conn.

**Economy**—Air Conditioning Units, Heaters. International Heater Co., Utica, N. Y.

**Economy**—Blow Pipe Hoods. Kirk & Blum Mfg. Co., Cincinnati, O.

**Economy**—Registers. Auer Register Co., Cleveland, O.

**Economy**—Stokers. Christensen Machine Co., Salt Lake City, Utah.

**Economy**—Ventilators. Arex Co., Chicago, Ill.

**Edmanco**—Ceilings, Shingles, Sheet Metal Products. Edwards Mfg. Co., Inc., Cincinnati, O.

**Emco**—Louvers, Skylights, Ventilators. W. F. Hirschman Co., Inc., Buffalo.

**Ekoco**—Furnaces, Washers. E. K. Campbell Heating Co., Kansas City.

**Elastikote**—Paint. Tropical Paint & Oil Co., Cleveland, O.

**El Dryol**—Waterproofing Compound. Gerard Chemical Co., Elizabeth, N. J.

**Electric Furnace Man**—Domestic Stoker. General Machine Co., Inc., New York City.

**Electric Janitor**—Regulators. Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.

**Elektrik-Ice**—Refrigerating Compressors. Uniflow Mfg. Company, Erie, Pa.

**Electro**—Sheet Roofing. American Brass Co., Waterbury, Conn.

**Electrol-Air**—Air Conditioning Furnaces. Associated Air Conditioning Corp., St. Louis, Mo.

**Electro Way**—Fans. Ward Mfg. Co., Detroit, Mich.



**Electrozone**—Ozonizers. Triox Eng. Co., St. Louis, Mo.  
**El Glykol**—Waterproofing Compound. Gerard Chemical Co., Elizabeth, N. J.  
**Elite**—Registers. Auer Register Co., Cleveland, O.  
**Emco**—Valves. Pittsburgh Equitable Meter Co., Pittsburgh, Pa.  
**Emerald Cord**—Belts. Goodyear Tire & Rubber Co., Akron, O.  
**Enamelite**—Duct Insulation. Presstite Engineering Co., St. Louis, Mo.  
**Enduro**—Sheets. Republic Steel Corp., Cleveland, O.  
**Epo**—Perforated Metals. Erdle Perforating Co., Rochester, N. Y.  
**Equator**—Heaters. Lennox Furnace Co., Marshalltown, Iowa.  
**Esico**—Electric Soldering Coppers. Electric Soldering Iron Co., Inc., New York, N. Y.  
**Eskimo**—Coils. Star Radiator Co., Los Angeles, Cal.  
**Eternium**—Paint. Barrett Co., New York City.  
**Eureka**—Furnaces. Home Stove Co., Indianapolis, Ind.  
**Evansway**—Furnaces. George Evans Corp., Moline, Ill.  
**Evco**—Valves. Electric Valve Mfg. Co., New York, N. Y.  
**Everdur**—Plates, Sheets, Structural Shapes, Welding Rod. American Brass Co., Waterbury, Conn.  
**Everedy**—Humidifiers, Oil Burners. Oil Burner Builders, Inc., Bellevue, Ia.  
**Everlast**—Air Conditioning Units, Furnaces. Pacific Gas Radiator Co., Los Angeles, Cal.

## F

**FAU**—Forced Air Furnace Unit. Payne Furnace & Supply Co., Beverly Hills, Cal.  
**F & E**—Underfeed Stokers. Flynn & Emrich Co., Baltimore, Md.  
**Fabrikated**—Grilles, Registers. Independent Register Co., Cleveland, O.  
**Fairweather**—Air Conditioning Units, Blowers and Blower Units, Washers. Furblo Co., Hermansville, Mich.  
**Falco**—Sheets. Fairmount Aluminum Co., Fairmont, W. Va.  
**Farquaire**—Air Conditioning Units, Blower Units. Farquhar Furnace Co., Wilmington, O.  
**FarQuar**—Furnaces. Farquhar Furnace Co., Wilmington, O.  
**Faultless**—Furnaces, Heaters. Standard Furnace & Supply Co., Omaha, Nebr.  
**Favorite**—Furnace and Smoke Pipe Fittings and Accessories. Williamson Heater Co., Cincinnati, O.  
**Featherfin**—Coils. L. J. Wing Mfg. Co., New York, N. Y.  
**F Electric**—Fan Roof Ventilators. W. F. Hirschman Co., Inc., Buffalo, N. Y.  
**Ferrocilad**—Building Insulation. Truscon Steel Co., Youngstown, O.  
**Ferrocrafft**—Grilles. Tuttle & Bailey, Inc., New Britain, Conn.  
**Ferrogird**—Grilles. Tuttle & Bailey, Inc., New Britain, Conn.  
**Ferro-Therm**—Insulation. American Flange & Mfg. Co., Inc., New York.  
**Ferroweld**—Arc Welding Electrodes. Lincoln Electric Co., Cleveland, O.  
**Fiberglas**—Insulation. Owens-Illinois Glass Co., Toledo, Ohio.  
**Fibrofelt**—Insulation. Union Fibre Co., Inc., Winona, Minn.  
**Filteraire**—Air Filters. Wilson & Co., Chicago, Ill.  
**Filteraire**—Window Ventilator-filter units. Davies Air Filter Co., New York City.  
**Filtered Aire**—Blowers and Blower Units. American Foundry & Furnace Co., Bloomington, Ill.

**Findlay**—Stokers. Bluffton Mfg. Co., Findlay, O.  
**Fine Air**—Air Conditioning Units. Norge Heating & Conditioning Div., Borg-Warner Corp., Detroit, Mich.  
**Firecrete**—Refractories. Johns-Manville, New York, N. Y.  
**Fireite**—Cement. Johns-Manville, New York, N. Y.  
**Fire-King**—Stokers. Sinker-Davis Co., Indianapolis, Ind.  
**Fire Tender**—Stokers. Holcomb & Hoke Mfg. Co., Indianapolis, Ind.  
**Firma**—Ventilators. W. F. Hirschman Co., Inc., Buffalo, N. Y.  
**Fitchburg**—Oil Burners. E. W. Skinner Co., Fitchburg, Mass.  
**Fitrte**—Conductor, Eaves Trough and Gutter Fittings and Accessories, Skylight Lifts, Snow Guards, Ventilators. David Levow, New York.  
**Fitzgibbonsaire**—Air Conditioning Unit. Fitzgibbons Boiler Co., Inc., New York City.  
**Fixit**—Cement. National Mfg. Corp., Tonawanda, N. Y.  
**Fleetweld**—Arc Welding Electrodes. Lincoln Electric Co., Cleveland, O.  
**Fleur de Lis**—Conductor Heads and Fittings. Royal-Apex Mfg. Corp., Brooklyn, N. Y.  
**Flexarc**—Arc Welders. Westinghouse Electric & Mfg. Co., East Pittsburgh.  
**Floxy**—Solder. Merchant & Evans Co., Philadelphia, Pa.  
**Flo-Warm**—Coal, Oil, Gas and Stoker-Fired Furnaces. Williamson Heater Co., Cincinnati, Ohio.  
**Fluid Heat**—Air Conditioning Units, Furnaces, Oil Burners. Anchor Post Fence Co., Baltimore, Md.  
**Forbes Syphonaire**—Ventilators. Western Rotary Ventilator Co., Inc., Los Angeles, Cal.  
**Forbes Tri-Feller**—Fans. Western Rotary Ventilator Co., Inc., Los Angeles, Cal.  
**Fosco**—Cornices, Metal Ceilings, Skylights, etc. F. O. Schoedinger Co., Columbus, O.  
**Franklin**—Stokers. Columbus Metal Products, Inc., Columbus, O.  
**Freeflo**—Grilles. Trane Co., LaCrosse, Wis.  
**Free-Man**—Stokers. Illinois Iron & Bolt Co., Chicago, Ill.  
**Freeport**—Oil Burners. Holtum Mfg. Co., Freeport, Ill.  
**Freezem**—Blowers. Peterson Freezem Mfg. Co., Kansas City, Mo.  
**Front End**—Paint. Barrett Co., New York, N. Y.  
**Front Bank**—Furnaces. Liberty Foundry Co., St. Louis, Mo.  
**Furnastender**—Stoker. Steel Products Engineering Co., Springfield, O.  
**Furnastoker**—Stokers. Steel Products Engineering Co., Springfield, O.  
**Fyr-feeder**—Stokers. American Coal Burner Company, Chicago, Ill.  
**Fyr-Fly**—Oil Burners. Aldrich Co., Peoria, Ill.

## G

**G. E.**—Air Conditioning Units, Controls, Motors, Welders. General Electric Co., New York City and Schenectady.  
**G-F-K**—Gas Conversion Burners. Sioux City Foundry and Boiler Co., Sioux City, Iowa.  
**G & M Stokermatic**—Stokers. The Stokermatic Co., Salt Lake City.  
**G-M**—Cabinets, Casings, Faces, Grilles, Louvers, Shutters, Perforated Metals, Ornamental Mouldings and Trim, Registers, Register Shields, Metal Stampings, Ventilators. Gillian Mfg. Co., Ferndale, Mich.

**GE**—Air Conditioning Units and Coils. General Refrigeration Corp., Beloit, Wis.  
**Gale**—Oil Burners, Cabinets, Ducts, Fittings, Accessories, Char-Gale Mfg. Co., Minneapolis, Minn.  
**Garland**—Furnaces, Heaters, Repairs. Detroit-Michigan Stove Co., Detroit.  
**Garrick**—Regulators. Hays Corp., Michigan City, Ind.  
**Gasool**—Combination Coal and Gas Furnaces. Stewart Furnace Co., Pittsburgh, Pa.  
**Gas-Era**—Furnaces. L. J. Mueller Furnace Co., Milwaukee, Wis.  
**Gastite**—Furnaces. Waterman - Waterbury Co., Minneapolis, Minn.  
**Gem**—Furnaces. Robinson Furnace Co., Chicago, Ill.  
**Gem**—Soldering Furnaces. Burgess Soldering Furnace Co., Columbus, O.  
**Gen-Arc**—Arc Welders. General Equipment Co., Wichita, Kan.  
**Genasco**—Cement, Paint, Roofing, Shingles, Waterproofing Compounds. Barber Co., Philadelphia, Pa.  
**General**—Heaters. Agricola Furnace Co., Inc., Gadsden, Ala.  
**Generator**—Coils. Hotstream Heater Co., Cleveland, O.  
**Genit**—Oil Burner. Nu-Way Corp., Rock Island, Ill.  
**Genuine Detroit**—Controls. Detroit Lubricator Co., Detroit, Mich.  
**Giant**—Oil Burners. Aldrich Co., Peoria, Ill.  
**Giant Nite**—Fans, Ventilators. Russell Electric Co., Chicago, Ill.  
**Gibraltar**—Heaters. P. H. McGirl Foundry & Furnace Works, Bloomington, Ill.  
**Gilbarco**—Furnaces, Air Conditioning Units. Gilbert & Barker Mfg. Co., Springfield, Mass.  
**Gilt Edge**—Flat Belts. J. E. Rhoads & Sons, Philadelphia, Pa.  
**Gilt Edge**—Furnaces and Stokers. Schwab Furnace & Mfg. Co., Cedar Grove, Wis.  
**Gimco**—Insulation. General Insulating & Mfg. Co., Alexandria, Ind.  
**Globe**—Eaves Trough and Gutters, Roofing, Sheets, Shingles and Tile. New Port Rolling Mill Co., Newport, Ky.  
**Gohi**—Eaves Trough & Gutters, Roofing. Newport Rolling Mill Co., Newport, Ky.  
**Golden Rod**—Air Conditioning Units, Blowers. F. Jaden Mfg. Co., Inc., Hastings, Nebr.  
**Golden Star**—Furnaces, Ridge Rolls and Ridging. J. M. & L. A. Osborn Co., Cleveland, O.  
**Goss**—Humidistats. W. R. Ripley Co., Tacoma, Wash.  
**Gray**—Nibbling Machine. W. J. Savage Co., Knoxville, Tenn.  
**Graylite**—Building and Duct Insulation. Insulite Co., Minneapolis, Minn.  
**GE-Lipman**—Refrigerating Compressors. General Refrigeration Corp., Beloit, Wis.  
**Grid**—Heating and Cooling Coils. Unit Heater & Cooler Co., Wausau, Wis.  
**Grillometer**—Direct Reading Air Velocity Meter. Detroit Air Meter Co., Detroit, Mich.  
**Gulfsteel**—Nails, Plates, Ridge Rolls and Ridging, Roofing, Sheets, Structural Shapes, Wire. Gulf States Steel Co., Birmingham, Ala.

## H

**H & C**—Chain, Clips and Tips, Faces, Grilles, Pulleys, Quadrants, Registers, Regulators, Ventilators. Hart & Cooley Mfg. Co., Chicago, Ill.  
**Haals**—Louvers. American Sheet Metal Works, New Orleans, La.



**Half-Saver**—Air Conditioning Furnace Units. Knox Stove Works, Knoxville, Tenn.

**Hairbestos**—Insulation. Wilson & Co., Inc., Chicago, Ill.

**Haircraft**—Insulation. Wilson & Co., Inc., Chicago, Ill.

**Handnib**—Punches. National Machine Tool Co., Racine, Wis.

**Handy**—Furnace and Smoke Pipe, Prefabricated Ducts and Fittings, Ventilators. F. Meyer & Bro. Co., Peoria, Ill.

**Handy-Andy**—Clinker Tong. Northwestern Stove Repair Co., Chicago, Ill.

**Handy Change**—Arc Welders. Maple Valley Mfg. Co., Mapleton, Iowa.

**Happy Thought**—Heaters. Pittston Stove Co., Pittston, Pa.

**Hardweld**—Arc Welding Electrodes. Lincoln Electric Co., Cleveland, O.

**Health Air**—Blowers, Furnaces, Humidifiers, Washers. Economy Baler Co., Ann Arbor, Mich.

**Health-aire**—Attic Ventilators. Johnson Fan & Blower Corp., Chicago, Ill.

**Healthmaster**—Air Conditioning Units, Blowers, Ducts and Fittings, Furnaces, Heaters. Chandler Co., Cedar Rapids, Iowa.

**Heat-Aid**—Furnace Linings. Pyrolite Products Co., Cleveland, Ohio.

**Heat-Bustler**—Fans. American Foundry & Furnace Co., Bloomington, Ill.

**Heat-Pak**—Oil Burners. Aldrich Co., Peoria, Ill.

**Heatrols**—Heaters. Estate Stove Co., Hamilton, O.

**Heatseal**—Insulation. Ehret Magnesia Mfg. Co., Valley Forge, Pa.

**Heatseal**—Oil Burners. Crystal Refrigerator Co., Fremont, Nebr.

**Heatset**—Regulators. Automatic Humidifier Co., Cedar Falls, Ia.

**Heaver**—Furnaces. Danville Stove & Mfg. Co., Danville, Pa.

**Heavyduty**—Damper Quadrants. Parker-Kalon Corp., New York, N. Y.

**Heetrozone, The**—Air Conditioning Units. American Air Conditioning Co., Minneapolis, Minn.

**Hellite**—Refractories. Johns - Manville, New York, N. Y.

**Hercules**—Arc Welders. Commonwealth Mfg. Corp., Cincinnati, O.

**Hercules**—Fan Roof Ventilators. W. F. Hirschman Co., Inc., Buffalo, N. Y.

**Hercules**—Furnaces. Johnston Gas Furnace Corp., Los Angeles, Cal.

**Hercules**—Heavy Duty Furnace. Lennox Furnace Co., Inc., Marshalltown, Ia.

**Hermetic**—Furnaces. Favorite Mfg. Co., Piqua, O.

**Hero**—Furnaces. Standard Foundry & Furnace Co., DeKalb, Ill.

**Hero**—Heaters. J. V. Patten Co., Sycamore, Ill.

**Highflex**—Belts. B. F. Goodrich Co., Akron, O.

**Highway**—Copper Iron. Apollo Steel Co., Apollo, Pa.

**Hitoncast**—Grilles. Tuttle & Bailey, Inc., New Britain, Conn.

**Hivelair**—Grilles. Tuttle & Bailey, Inc., New Britain, Conn.

**Hodell**—Furnace Chain. Chain Products Co., Cleveland, O.

**Hoffman**—Oil Burners. Shedlov Oil Burners, Inc., Minneapolis, Minn.

**Hold Heat**—Soldering Coppers. Turner Brass Works, Sycamore, Ill.

**Hold-Heat**—Controls, Fans, Humidifiers, Thermostats, Transformers. Russell Electric Co., Chicago, Ill.

**Holtite-Phillips**—Screws and Bolts. Continental Screw Co., New Bedford, Mass.

**Home**—Furnaces. Rock Island Stove Co., Rock Island, Ill.

**Home**—Weather Strips. Chamberlin Metal Weather Strip Co., Detroit.

**Hot Blast**—Soldering Furnaces and Torches. Turner Brass Works, Sycamore, Ill.

**Hotco**—Air Conditioning Units, Furnaces, Oil Burners. Hotentot Co., Inc., Omaha, Nebr.

**Hot-Kold**—Furnaces. Edwards Mfg. Co., Inc., Cincinnati, O.

**Hot Spot**—Electric Welders. Acme Electric Welder Co., Huntington Park, Cal.

**Hot Wave**—Coils. Rudy Furnace Co., Dowagiac, Mich.

**Howle**—Heat Savers. Condensation Engineering Corp., Chicago, Ill.

**Hoyt**—Roofing. National Lead Co., New York, N. Y.

**Huber**—Overfeed Stokers. Flynn & Emrich Co., Baltimore, Md.

**Humidair**—Humidifiers, Washers. American Foundry & Furnace Co., Bloomington, Ill.

**Humidiguide**—Hygrometer. Taylor Instrument Companies, Rochester, N. Y.

**Humidostat**—Humidistats. Johnson Service Co., Milwaukee, Wis.

**Humitherm**—Air Conditioning Units. Grinnell Co., Inc., Providence, R. I.

**Humitrol**—Humidity Controls. Mayflower-Lewis Corp., St. Paul, Minn.

**Hydron**—Thermostatic Bi-Metals. Clifford Mfg. Co., Boston, Mass.

**Hydron**—Concrete Waterproofing Paint. Barrett Co., New York City.

**Hydro-Proof**—Water-proofing Compounds. Asphalt Products Co., Syracuse, N. Y.

**Hy-Duty**—Fan Bearings, Fans, Blowers, Pumps, Ventilators. Wheel s. Schwitzer-Cummins Co., Indianapolis, Ind.

**Hy-Power**—Furnaces. Rudy Furnace Co., Dowagiac, Mich.

**Hy-Power**—Snips and Shears. Wiss & Sons Co., J., Newark, N. J.

**Hyro**—Dampers, Handles, Punches, Regulators. Parker-Kalon Corp., New York, N. Y.

**Hytect**—Paint. National Mfg. Co., Tonawanda, N. Y.

## I

**Ice-O-Matic**—Compressors. Williams Oil-O-Matic Heating Corp., Bloomington, Ill.

**Ideal**—Air Conditioning Units. Norge Heating & Conditioning Div.—Borg-Warner Corp., Detroit, Mich.

**Ideal**—Eaves Trough and Gutters, Fittings, Pipe, etc. Jas. H. Watson Co., Inc., Bradley, Ill.

**Ideal**—Roofing Nails. Tennessee Coal, Iron & Railroad Co., Birmingham, Ala.

**Ideal King**—Furnaces. Kansas City Furnace Co., Kansas City, Mo.

**IEC**—Stoker Control, Relays, Switches, Timers. Industrial Engineering Corp., Evansville, Ind.

**Ilgair**—Fans. Ilg Electric Ventilating Co., Chicago, Ill.

**Ilg-Kold**—Air Conditioning Units. Ilg Electric Ventilating Co., Chicago.

**Imperial**—Hangers. Berger Bros. Co., Philadelphia, Pa.

**In-Cel-Wood**—Insulation. Cornell Wood Products Co., Chicago, Ill.

**Inco**—Welding Rod. International Nickel Co., Inc., New York City.

**Indian**—Furnaces. Rudy Furnace Co., Dowagiac, Mich.

**Inglad**—Sheets. Ingersoll Steel & Disc Div., Borg-Warner Corp., Chicago.

**Insaluma**—Insulating Fire Brick. Chicago Fire Brick Co., Chicago, Ill.

**Insa-Lute**—Furnace Cement. Sauereisen Cements Co., Pittsburgh, Pa.

**Ins-Light**—Building and Duct Insulation. Insulite Co., Minneapolis.

**Insulwool**—Sound Deadening Duct Insulation (blanket). General Insulating Products Co., Brooklyn, N. Y.

**Interlock**—Conductor Pipe. Milcor Steel Co., Milwaukee, Wis.

**Invisible Joint**—Metal Ceilings. Milcor Steel Co., Milwaukee, Wis.

**Ironset**—Furnace Cement. Fireline Stove & Furnace Lining Co., Chicago, Ill.

**Ironsides**—Paint. Thompson & Co., Pittsburgh, Pa.

**Ironston**—Gas Burners, Heaters. Continental Stove Corp., Ironton, O.

**Isl City**—Registers. Rock Island Register Co., Rock Island, Ill.

**Iso-Tem**—Automatic Heat Control. Tem Products Co., Youngstown, Ohio.

**Iso-Tem**—Furnace Control. Air Conditioning Supply Co., Cleveland, Ohio.

## J

**J-M**—Insulation, Roofing. Johns - Manville, New York, N. Y.

**J.M.C.**—Oil Burners. Johnson Mfg. Co., Waterloo, Iowa.

**Jack Frost**—Insulation. Barrett Co., New York City.

**Janitrol**—Air Conditioning Units, Furnaces, Gas Burners. Surface Combustion Corp., Toledo, O.

**Jennings**—Pumps. Nash Engineering Co., South Norwalk, Conn.

**Jetair**—Grilles. Tuttle & Bailey, Inc., New Britain, Conn.

**Jewel**—Furnaces, Heaters, Repairs. Detroit-Michigan Stove Co., Detroit.

**Jifco**—Coils. Hotstream Heater Co., Cleveland, O.

**Jointite**—Insulation. Mundet Cork Corp., New York, N. Y.

**Juneaire**—Air Conditioning Units, Furnaces. American Foundry & Furnace Co., Bloomington, Ill.

**Junista**—Soldering Flux. Geo. W. Diener Mfg. Co., Chicago, Ill.

**Junior**—Ozonizers. Corozone Air Conditioning Corp., Cleveland, O.

**Junior-Aire**—Oil-Burning Air Conditioning Furnace. Lochinvar Corp., Dearborn, Mich.

**Justrite**—Duct Fittings. Corbman Bros., Inc., Philadelphia, Pa.

**Justrite L-Bo**—Furnace Pipe & Fittings. Corbman Bros., Inc., Philadelphia.

## K

**K.S.V.'s**—Ventilators. Kernchen Co., Chicago, Ill.

**KableKord**—Belts. L. H. Gilmer Co., Philadelphia, Pa.

**Kant Klog**—Nozzles. Howell Manufacturing Co., Kansas City, Mo.

**Kant Krush**—Roof Strainers. Grand Rapids Wire Products Co., Grand Rapids, Mich.

**Kentucky**—Eaves Trough and Gutters, Roofing, Sheets. Newport Rolling Mill Co., Newport, Ky.

**Kero-Therm**—Cabinet Heaters. Motor Wheel Corp., Heater Div., Lansing, Mich.

**Keystone**—Heaters. J. V. Patten Co., Sycamore, Ill.

**Keystone**—Sheets. Carnegie Illinois Steel Corp., Pittsburgh, Pa.

**Klixon**—Controls, Switches, Thermostats, Timers. Spencer Thermostat Co., Attleboro, Mass.

**Kitchenaire**—Fans. Allen Corp., Detroit.

**Knock-Out**—Arc Welding Electrodes, Welding Rod, Arc Welders. K. O. Lee & Son Co., Aberdeen, S. D.

**Knowles**—Air Conditioning Furnace. Marshall Heating Co., Minneapolis.

**Knox**—Smoke Pipe. Waterloo Register Co., Waterloo, Ia.

**Kom-Pak**—Filters. Independent Air Filter Co., Chicago, Ill.

**Konical**—Ventilators. Milcor Steel Co., Milwaukee, Wis.

**Kooler-Aire**—Blower - Washer Combinations. U. S. Air Conditioning Corp., Minneapolis, Minn.

**Koppax**—Paint. Koppers Co., Pittsburgh, Pa.

**Kristokrak**—Enamels and Lacquers. Zapon-Brevolite Division Atlas Powder Co., North Chicago, Ill.

**KruKo**—Furnaces. Kruse Co., Inc., Indianapolis, Ind.

**Kuehn's**—Gutters, Ridge Rolls and Ridging. Milcor Steel Co., Milwaukee.

**Kwiklok**—Humidifier Fittings. Air Conditioning Supply Co., Cleveland.

**Kwikturn**—Humidifier Fittings. Air Conditioning Supply Co., Cleveland.

## L

**L. A.**—Motors. Louis Allis Co., Milwaukee, Wis.

**L & N**—Instruments. Leeds & Northrup Co., Philadelphia, Pa.

**L & R**—Conductor Pipe. Lamb & Ritchie Co., Cambridge, Mass.

**L-R**—Flexible Couplings. Lovejoy Flexible Coupling Co., Chicago, Ill.

**L-U**—Gravity Roof Ventilators. W. F. Hirschman Co., Inc., Buffalo, N. Y.

**La Condishundaire**—Air Conditioning Units. Merrill Co., Inc., Boston.

**Lakeside**—Blowers. Furblo Co., Hermansville, Mich.

**Lancol**—Stainless Steel Soldering Flux. F. H. Langsenkamp Co., Indianapolis, Ind.

**Laurel**—Repairs. Detroit-Michigan Stove Co., Detroit, Mich.

**Lawson**—Heaters. Continental Stove Corp., Ironton, O.

**Leader**—Oil Burners. Pressure Oil Burners, Inc., York, Pa.

**Lehigh**—Furnaces, Heaters. Pittston Stove Co., Pittston, Pa.

**LeRoy**—Fan and Gravity Roof Ventilators. W. F. Hirschman Co., Inc., Buffalo, N. Y.

**Liberty**—Paint. Carter Paint Co., Liberty, Ind.

**Lifetime**—Furnace Pipe Fittings & Accessories. Campbell Heating Co., Des Moines, Ia.

**Lightweld**—Arc Welding Electrodes. Lincoln Electric Co., Cleveland, O.

**Lima**—Stokers. John R. Carnes, Inc., Lima, O.

**Lincoln**—Furnaces. American Foundry & Furnace Co., Bloomington, Ill.

**Line-Weld**—Motors. Lincoln Electric Co., Cleveland, O.

**Linoboard**—Insulation. Union Fibre Co., Inc., Winona, Minn.

**Linofelt**—Insulation. Union Fibre Co., Inc., Winona, Minn.

**Liquidelastigum**—Paint. Barrett Co., New York City.

**Little Blacksmith**—Punches. J. F. Kidder Mfg. Co., Inc., Burlington, Vt.

**Little Giant**—Time Switches. Tork Clock Co., Inc., Mt. Vernon, N. Y.

**Little Janitor**—Regulators. Tillery's Little Janitor Clock Co., Newark, N. J.

**Llenroo**—Fire Doors. Cornell Iron Works, Inc., Long Island City, N. Y.

**Lloyd's**—Stainless Steel Soldering Flux. Alumaweld Co. of America, Chicago.

**Lo-Blast**—Gas Conversion Burners. National Machine Works, Chicago, Ill.

**Lo-Boy**—Stokers. Whiting Corp., Harvey, Ill.

**Lockjoint**—Stove Pipe. Milcor Steel Co., Milwaukee, Wis.

**LokJoint**—Building Insulation. Insulite Co., Minneapolis, Minn.

**Lornate**—Chimney Caps & Tops, Ventilators. W. F. Hirschman Co., Inc., Buffalo, N. Y.

**LoStoker**—Stokers. Detroit Stoker Co., Detroit, Mich.

**Luco**—Acid Brushes, Compounds, Flux, Solder. Thos. F. Lukens Metal Co., Philadelphia, Pa.

**Luminall**—Paint. National Mfg. Co., Tonawanda, N. Y.

**Lumino**—Paint. Koppers Co., Pittsburgh, Pa.

## M

**M. E.**—Air Conditioning Units. C. A. Dunham Co., Chicago, Ill.

**M & E**—Compressors, Solder. Merchant & Evans Co., Philadelphia, Pa.

**M & H**—Zinc Sheets. Matthiessen & Hegeler Zinc Co., LaSalle, Ill.

**M & M**—Humidifier Valves. McDonnell & Miller, Chicago, Ill.

**MSC**—Controls, Switches, Thermometers. Micro Switch Corp., Freeport, Ill.

**M-VB**—Humidifier Fittings. Scovill Mfg. Co., Morency-Van Buren Div., Sturgis, Mich.

**Macheta**—Fans and Fan Blades. Aerovent Fan Co., Piqua, O.

**Mack**—Heaters. J. V. Patten Co., Sycamore, Ill.

**Magic**—Chimney Caps and Tops. Providence Cornice Co., Providence, R. I.

**Majestic**—Flashings, Roofing, Skylights, Ventilators. W. A. Fingles, Inc., Baltimore, Md.

**Manganweld**—Arc Welding Electrodes. Lincoln Electric Co., Cleveland, O.

**Mark Time**—Time Switches. M. H. Rhodes, Inc., Hartford, Conn.

**Martin**—Dampers, Furnaces. Phillips Heating, Ventilating & Mfg. Co., Los Angeles, Cal.

**Marvel**—Punches. Armstrong-Blum Mfg. Co., Chicago, Ill.

**Massachusetts**—Blowers, Fans. Bishop & Babcock Sales Co., Cleveland, O.

**Master**—Cabinet Heaters. Independence Stove & Furnace Co., Independence, Mo.

**Master**—Controls. White Mfg. Co., St. Paul, Minn.

**Master**—Hangers and Fittings. Royal Apex Mfg. Corp., Brooklyn, N. Y.

**Master Flux**—Soldering Flux. J. M. & L. A. Osborn Co., Cleveland, O.

**Master Kraft**—Air Conditioning Units, Oil Burners. Harvey-Whipple, Inc., Springfield, Mass.

**Master Stoker**—Stokers. Muncie Gear Works, Inc., Muncie, Ind.

**Mastr-Lok**—Pipe Fittings. Parkersburg Iron & Steel Co., Parkersburg, W. Va.

**Mayflower**—Air Conditioning Units, Refrigerating Compressors. Hardy Mfg. Co., Dayton, O.

**McIlvaine**—Oil Burners. Landwehr Heating Corp., Philadelphia, Pa.

**Melloblu**—Gas Burners. Beck Engineering Combustion Kompany, St. Louis, Mo.

**Mellow**—Furnaces. Liberty Foundry Co., St. Louis, Mo.

**Metalace**—Registers. American Foundry & Furnace Co., Bloomington, Ill.

**Metalane**—Metal Weather Strips. Monarch Metal Weatherstrip Corp., St. Louis, Mo.

**Metallation**—Insulation. Reynolds Corp., New York, N. Y.

**Metal Master**—Brakes, Shears, Welders. Glascock Bros. Mfg. Co., Muncie, Ind.

**Metalmaster**—Rotary Saw. Continental Machine Specialties, Inc., Minneapolis, Minn.

**Met-L-Al**—Weather Strips. Metal Products Co., Cincinnati, O.

**Metrotherm**—Thermostats. General Controls Co., San Francisco, Cal.

**Microstat**—Thermostats. Julien P. Friez & Sons, Inc., Baltimore, Md.

**Midas**—Spot Welders. Commonwealth Mfg. Corp., Cincinnati, O.

**Midget**—Ozonizers. Corozone Air Conditioning Corp., Cleveland, O.

**Midget Marvel**—Arc Welders. Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

**Miles, Jr.**—Propeller Furnace Fans. Henry Furnace & Foundry Co., Cleveland, O.

**Milwaukee**—Ventilators. Milcor Steel Co., Milwaukee, Wis.

**Mistoli**—Oil Burners. Wayne Oil Burner Corp., Fort Wayne, Ind.

**Mistolator**—Oil Burners, Automatic Burner Corp., Chicago, Ill.

**Model**—Furnaces, Heaters. Home Stove Co., Indianapolis, Ind.

**Model A**—Furnaces, Heaters. Williamson Heater Co., Cincinnati, O.

**Moderator**—Air Conditioning Units. Clarage Fan Co., Kalamazoo, Mich.

**Moderne**—Blowers, Furnaces. Agricola Furnace Co., Inc., Gadsden, Ala.

**Modern Aire**—Warm Air Furnaces. Des Moines Stove Repair Co., Des Moines, Iowa.

**Moderne Aire**—Furnaces, Air Conditioning Units, Blowers. Agricola Furnace Co., Gadsden, Ala.

**Modern Hearth**—Furnaces. Thompson Mfg. Co., Denver, Colo.

**Modernistic**—Heaters. Agricola Furnace Co., Inc., Gadsden, Ala.

**Moditherm**—Air Conditioning Units. Clarage Fan Co., Kalamazoo, Mich.

**Modutrol**—Controls. Minneapolis-Honeywell Regulator Co., Minneapolis.

**Moistair Blended Iron**—Furnaces. Round Oak Co., Dowagiac, Mich.

**Moistair Boiler Plate**—Furnaces. Round Oak Co., Dowagiac, Mich.

**Monarch**—Furnaces. Kruse & Dewenter Co., Indianapolis, Ind.

**Moncrief**—Furnaces, Furnace Repairs, Prefabricated Ducts. Henry Furnace & Foundry Co., Cleveland, O.

**Morning Air**—Furnaces. Jackson Sheet Metal Wks., Ogden, Utah.

**Motex**—Fan Bearings and Solder. Consolidated Metals Corp., Detroit.

**Moto-Heat**—Oil Burners. Brigham Oil Burner Co., St. Louis, Mo.

**Muelleraire**—Air Conditioning Units. L. J. Mueller Furnace Co., Milwaukee, Wis.

**Multiclone**—Collectors. Research Corp., New York, N. Y.

**Multi-Panel**—Filters. American Air Filter Co., Inc., Louisville, Ky.

**Multitherm**—Air Conditioning Units. Clarage Fan Co., Kalamazoo, Mich.

**Multi-V**—Filters. Staynew Filter Corp., Rochester, N. Y.

**Munro**—Pipe. Martin Bros., Rochester, N. Y.

## N

**Nairoil**—Oil Burners. National Airoil Burner Co., Philadelphia, Pa.

**National**—Air Conditioning Units, Washers. P. H. Magill Foundry & Furnace Wks., Bloomington, Ill.

**National**—Damper Clips and Tips. U. S. Register Co., Battle Creek, Mich.

**National**—Furnaces, Heaters. Excelsior Stove & Mfg. Co., Quincy, Ill.

**Natroco**—Paint. National Mfg. Corp., Tonawanda, N. Y.



**NaturZone**—Insulation. Wilson & Co., Inc., Chicago, Ill.

**Nelco**—Duct Insulation. B. F. Nelson Mfg. Co., Minneapolis, Minn.

**Nelson-Bertossa**—Air Conditioning Units, Furnaces. Nelson Co., Detroit, Mich.

**Nelson**—Stokers. Heating Assurance, Inc., Spokane, Wash.

**Nesbit**—Furnaces. Standard Furnace & Supply Co., Omaha, Nebr.

**New American**—Smoke Pipe Dampers. Griswold Mfg. Co., Erie, Pa.

**New Gibraltar**—Heaters. P. H. MaGill Foundry & Furnace Wks., Bloomington, Ill.

**Newmanco**—Kalamein Doors, Grilles, Registers. Newman Brothers, Inc., Cincinnati, O.

**Newport**—Instruments. Johnson Tool Co., Inc., East Providence, R. I.

**Niagara**—Air Conditioning Units, Furnaces. Forest City Foundries Co., Cleveland, O.

**Niteair**—Night Air Cooling Fans. Lau Blower Co., Dayton, Ohio.

**Nitroil**—Nozzles. Hubbard Co., Minneapolis, Minn.

**Nokol**—Oil Burners. Petroleum Heat & Power Co., Stamford, Conn.

**Non-Con-Dux**—Cement, Insulation. Paint, Paper, Paste. Grant Wilson, Inc., Chicago, Ill.

**No Noise**—Blowers. American Foundry & Furnace Co., Bloomington, Ill.

**Norblo**—Blowers, Collectors and Air Washers. Northern Blower Co., Cleveland, Ohio.

**Norco**—Furnaces, Furnace Cement, Pipe and Fittings, Registers and Grilles, Air Conditioning, Tank Heaters, Stoves, etc. Northwestern Stove Repair Co., Chicago, Ill.

**Norfolk**—Blower - Filters, Furnaces, Heaters, Humidifiers. Sioux City Foundry and Boiler Co., Sioux City.

**Northland**—Heaters. J. V. Patten Co., Sycamore, Ill.

**Northwestern**—Furnaces. Western Furnaces, Inc., Tacoma, Wash.

**Norwester**—Blowers. Grand Rapids Die & Tool Co., Grand Rapids, Mich.

**Norwol**—Insulation. Norristown Magnesite & Asbestos Co., Norristown, Pa.

**No-Sag**—Register Shields. Pentecost & Craft Co., Terre Haute, Ind.

**No. Streak**—Registers. Rock Island Register Co., Rock Island, Ill.

**No-Ve-U**—Door Ventilators. Waterloo Register Co., Waterloo, Iowa.

**Novoid**—Aluminum Paint, Bases, Insulation. Cork Import Corp., New York, N. Y.

**Nu-Air**—Air Conditioning Units, Room Type, Summer and Year Around Blades and Fans. Meier Electric & Machine Co., Indianapolis, Ind.

**Nu-Air**—Ventilators. Milcor Steel Co., Milwaukee, Wis.

**Nu-Alpina**—Gravity Roof Ventilators. Milcor Steel Co., Milwaukee, Wis.

**Nu-Dry**—Furnace Cement. Pyrolite Products Co., Cleveland, O.

**Nugget**—Cabinet Heaters. Independence Stove & Furnace Co., Independence, Mo.

**Nu-Notch**—Ventilators. Knowles Mushroom Ventilator Co., New York, N. Y.

**Nutipe**—Gas Conversion Burners. Columbia Burner Company, Toledo.

**Nu-Way Evans**—Warm Air Conditioners. Nu-Way Corp., Rock Island, Ill.



**Ohio-Buckeye**—Stove Pipe. Reeves Steel & Mfg. Co., Dover, Ohio.

**Ohio Lock**—Furnace and Stove Pipe. Reeves Steel & Mfg. Co., Dover, Ohio.

**Oil - Economy**—Oil-Burning Air-Conditioning Furnace. International Heater Co., Utica, N. Y.

**Oil-Eighty**—Boiler Burner Unit. Fitzgibbons Boiler Co., Inc., New York.

**Oil Master**—Furnaces. Round Oak Co., Dowagiac, Mich.

**Oil Master Airklesner**—Air Conditioning Furnace. Round Oak Co., Dowagiac, Mich.

**Oil-O-Matic**—Oil Burners. Williams Oil-O-Matic Heating Corp., Bloomington, Ill.

**OK**—Conductor Strainers. U. S. Cistern Filter Mfg. Co., Bloomington, Ill.

**Oil-n-Aire**—Oil Burners. Aldrich Co., Peoria, Ill.

**Olympic**—Furnaces. Washington Stove Works, Everett, Wash.

**Open Dome**—Furnaces. American Furnace & Foundry Co., Milan, Mich.

**Orient**—Furnaces. Smuck-Thiele Co., Indianapolis, Ind.

**Orsatomat**—Flue Gas Analyzer. Hays Corp., Michigan City, Ind.

**Oshkosh**—Stokers. Leach Co., Oshkosh, Wis.

**OutWall**—Registers. Rock Island Register Co., Rock Island, Ill.

**Ovaltube**—Gas Burners. Beck Engineering Combustion Company, St. Louis.

**Oxweld**—Welding Apparatus. Linde Air Products Co., New York, N. Y.

**Ozite**—Duct Insulation. American Hair & Felt Co., Chicago, Ill.

## P

**P. & H.**—Motors. Harnischfeger Corp., Milwaukee, Wis.

**P. & H. Hansen**—Arc Welders. Harnischfeger Corp., Milwaukee, Wis.

**Pacificfelt**—Insulation. Pacific States Felt & Mfg. Co., Inc., San Francisco.

**Pacific**—Furnaces. W. W. Rosebraugh Co., Salem, Ore.

**Pacific Breeze**—Fans. Pryne & Co., Inc., Los Angeles, Cal.

**Packingsless**—Pumps. Chandler Co., Cedar Rapids, Ia.

**Palco Bark**—Insulation. Pacific Lumber Co., San Francisco, Cal.

**Paramount**—Flashings. Rochester Lead Works, Inc., Rochester, N. Y.

**Paramount**—Hollow Metal Windows. Willis Mfg. Co., Galesburg, Ill.

**Parco**—Skylight Lifts. Park City Cornice Works, Inc., Bridgeport, Conn.

**Patrola**—Heaters. J. V. Patten Co., Sycamore, Ill.

**Patterson**—Roofing Clips. American Sheet Metal Works, New Orleans.

**Pebble**—Grilles. American Foundry & Furnace Co., Bloomington, Ill.

**Pebble**—Registers. Auer Register Co., Cleveland, O.

**Peerless**—Blowers, Collectors, Washers. New York Blower Co., Chicago, Ill.

**Peerless**—Eaves Trough Hangers. Abbott Mfg. Co., Painesville, O.

**Penco**—Air Conditioning Units. Pennsylvania Furnace & Iron Co., Warren, Pa.

**Penn-Mont**—Slate Structural Slate Co., Pen Argyl, Pa.

**Penntrol**—Controls. Penn Electric Switch Co., Goshen, Ind.

**Perfect**—Furnaces, Humidifiers. Richardson & Boynton Co., New York.

**Perfect-Fit**—Metal Ceilings. Milcor Steel Co., Milwaukee, Wis.

**Permopad**—Filters. Independent Air Filter Co., Chicago, Ill.

**Perry**—Damper Clips and Tips. Griswold Mfg. Co., Erie, Pa.

**Pet**—Oil Burners. Aldrich Co., Peoria, Ill.

**Petro**—Oil Burners. Petroleum Heat & Power Co., Stamford, Conn.

**Pexto**—Metal Workers' Machines and Tools. Peck, Stow & Wilcox Co., Southington, Conn.

**Phaeton**—Heaters. Excelso Products Corp., Buffalo, N. Y.

**Pioneer**—Oil Burners. Scott-Newcomb, Inc., St. Louis, Mo.

**Plastic Cork**—Duct Insulation. Press-tite Engineering Co., St. Louis, Mo.

**Plastic Elastigum**—Cement. Barrett Co., New York City.

**Plastic PB**—Cement. Barrett Co., New York City.

**Plastikon**—Glazing Compounds. B. F. Goodrich Co., Akron, O.

**Pleasant Home**—Furnaces. Peerless Foundry Co., Inc., Indianapolis, Ind.

**Plexiform**—Blowers. Bayley Blower Co., Milwaukee, Wis.

**Plicast**—Refractories. Plibrico Jointless Firebrick Co., Chicago, Ill.

**Plymaco**—Air Filters. Plymouth Cordage Co., North Plymouth, Mass.

**Polar Giant**—Air Conditioning Units. Giant Manufacturing Co., Council Bluffs, Iowa.

**Porcelite**—Tile. Columbian Enameling & Stamping Co., Inc., Terre Haute, Ind.

**Portage**—Furnaces. XXth Century Heating & Ventilating Co., Akron, O.

**Positive Arc**—Arc Welders. Welding Apparatus Co., Chicago, Ill.

**Premier**—Arc Welding Electrodes, Welding Rod. American Steel & Wire Co., Chicago, Ill.

**Premier**—Furnace Vacuum Cleaner. Electric Vacuum Cleaner Co., Inc., Cleveland, O.

**Premier**—Sheets. Reeves Steel & Mfg. Co., Dover, Ohio.

**Premier**—Weather Strips. American Metal Weather Strip Co., Grand Rapids, Mich.

**Presstite**—Furnace and Roof Cement. Press-tite Engineering Co., St. Louis.

**Probert**—Kalamein Doors. California Cornice, Steel and Supply Corp., Los Angeles, Cal.

**Protection**—Soldering Furnaces and Torches. Clayton & Lambert Mfg. Co., Detroit, Mich.

**Protector**—Snow Guards. David Levow, New York City.

**Protectomotor**—Filters. Staynew Filter Corp., Rochester, N. Y.

**Plastoid**—Compounds, Furnace Cement. Plastic Products Co., Detroit, Mich.

**Power**—Flat Belts. J. E. Rhoads & Sons, Philadelphia, Pa.

**Premier Automatik**—Stoker-Fired Air Conditioning Furnaces. Meyer Furnace Co., Dowagiac, Mich.

**Prest-O-Lite**—Oxy-Acetylene Welding Equipment. Linde Air Products Co., New York, N. Y.

**Prest-O-Weld**—Oxy-Acetylene Welding Equipment. Linde Air Products Co., New York, N. Y.

**Protector**—Snow Guards. David Levow, New York, N. Y.

**Protex**—Protective Coating for Metal. Haydn F. White & Co., Cleveland.

**Pulversone**—Stokers. American Coal Burner Co., Chicago, Ill.

**Punkah**—Louvers. White Co., Kelvin and Wilfred B., Boston, Mass.

**Pure-Air**—Furnaces. Enterprise Boiler & Tank Works, Inc., Chicago, Ill.

**Pure-Aire**—Blower-Filter Units. Utility Fan & Mfg. Co., Los Angeles, Cal.

**Purox**—Oxy-Acetylene Welding Equipment. Linde Air Products Co., New York, N. Y.

**Pyrofelt**—Building and Duct Insulation. The Mineral Felt Co., Toledo, O.



**Quaker City**—Fittings and Accessories, Conductor, Eaves Trough and Gutter, Pipe. Berger Bros. Co., Philadelphia, Pa.



**Quick Cleaner**—Furnace Brushes. Pilley Packing & Flue Brush Mfg. Co., St. Louis, Mo.

**Quiet May**—Air Conditioning Furnaces, Oil Burners. May Oil Burner Corp., Baltimore, Md.

## R

**R. & G.**—Cold Air Faces, Grilles, Registers. Register & Grille Mfg. Co., Inc., Brooklyn, N. Y.

**R. & M.**—Fans, Motors. Robbins & Myers, Inc., Springfield, O.

**RBC**—Fan Bearings. Roller Bearing Co. of America, Trenton, N. J.

**R.M.C.**—Burners. Rotary Mfg. Co., Los Angeles, Cal.

**R-U-F**—Fans and Ventilators. Reed Unit-Fans, Inc., New Orleans, La.

**Race**—A. C. Furnace (Gas). Royal Air Conditioning Equipment, Compton, Cal.

**Radolite**—Refractories. Pyrolite Products Co., Cleveland, Ohio.

**Rainbow Mist**—Nozzles. Peterson Freezem Mfg. Co., Kansas City, Mo.

**Ralpo**—Sheet Metal Cutters. Ralph W. Poe, Canton, Ill.

**Rawl-Drive**—Hardened Masonry Nails. Rawlplug Co., Inc., New York City.

**Real Host**—Oil Burners. Harry C. Weiskittel Co., Inc., Baltimore, Md.

**Red Band**—Motors. Howell Electric Motors Co., Howell, Mich.

**Redi-Wall**—Eaves Trough Hangers. Abbott Mfg. Co., Painesville, O.

**Redox**—Paint. Thompson & Co., Pittsburgh, Pa.

**Red Spindle**—Dampers. Stover Mfg. & Engine Co., Freeport, Ill.

**Red Top**—Insulation. Owens-Illinois Glass Co., Toledo, O.

**Red Top**—Insulation. United States Gypsum Co., Chicago, Ill.

**Red Top**—Thermostats. H-B Instrument Company, Philadelphia, Pa.

**Reed**—Filters. American Air Filter Co., Inc., Louisville, Ky.

**ReFreshaire**—Winter Air Conditioning Units, Room Type. Summerheat Co., South Bend, Ind.

**Reg - Grill - Co**—Registers. Register & Grille Mfg. Co., Inc., Brooklyn, N. Y.

**Rego**—Oxy-Acetylene Welding Equipment. Bastian-Blessing Co., Chicago, Ill.

**Reillaloy**—Stove and Furnace Repairs. Pittsburgh Furnace Parts Co., Pittsburgh, Pa.

**Relay**—Filters. W. R. Ripley Co., Tacoma, Wash.

**Remote Control**—Grilles. Tuttle & Bailey, Inc., New Britain, Conn.

**Renu**—Filters. American Air Filter Co., Inc., Louisville, Ky.

**Republio**—Gas Conversion Burners. Autogas Corp., Chicago, Ill.

**Research**—Belts. Graton & Knight Co., Worcester, Mass.

**Rex**—Furnaces. Calkins & Pearce, Columbus, O.

**Rex-Airate**—Fans, Ventilators. Air Controls, Inc., Cleveland, O.

**Rex-Air-Pak**—Blower Units. Air Controls, Inc., Cleveland, O.

**Rexoil**—Air Conditioning Units, Oil Burners, Furnaces. Reif-Rexoil, Inc., Buffalo, N. Y.

**Rexistal**—Stainless Steels. Crucible Steel Co., of America, New York.

**Rival**—Copper and Zinc Straps. David Levow, New York, N. Y.

**Riverside**—Furnaces. Rock Island Stove Co., Rock Island, Ill.

**Rocktex**—Insulation. Philip Carey Co., Lockland, Cincinnati, O.

**Rohaco**—Pipe, Registers, Heat Savers. Roberts-Hamilton Co., Minneapolis.

**Roofkoter**—Paint. Tropical Paint & Oil Co., Cleveland, O.

**Rotoblast**—Furnaces. Moncrief Furnace Co., Atlanta, Ga.

**Rotoclone**—Dust Collectors. American Air Filter Co., Inc., Louisville, Ky.

**Rotofet**—Nozzles. Binks Mfg. Co., Chicago, Ill.

**Royal**—Air Conditioning Units, Furnaces. Hart & Crouse Co., Inc., Utica, N. Y.

**Royal**—Caulking Compounds, Cement, Paint. A. Wilhelm Co., Reading, Pa.

**Royal**—Dampers, Hangers, Strainers and Fittings. Royal-Apex Mfg. Corp., Brooklyn, N. Y.

**Royalair**—Air Conditioning Units, Furnaces. Rock Island Stove Co., Rock Island, Ill.

**Royalastic**—Asbestos Cement. A. Wilhelm Co., Reading, Pa.

**Royalbestos**—Furnace Cement. A. Wilhelm Co., Reading, Pa.

**Royal Blue**—Acid and Furnace Brushes. Schaefer Brush Mfg. Co., Milwaukee, Wis.

**Royalseal**—Asbestos Paint. A. Wilhelm Co., Reading, Pa.

**Rubalt**—Paint. Alfred Hague & Co., Inc., Brooklyn, N. Y.

**Rubyfluid**—Solder, Soldering Flux, Tinning Compounds. Ruby Chemical Co., Columbus, O.

**Rusco**—Air Conditioning Units. Russell Insulation Co., F. C., Baltimore, Md.

## S

**S.A.C.**—Air Conditioning Units. Standard Air Conditioning, Inc., New York, N. Y.

**S-C**—Furnaces. Surface Combustion Corp., Toledo, O.

**S-E**—Gravity Roof Ventilators. W. F. Hirschman Co., Inc., Buffalo, N. Y.

**S-F**—Arc Welding Electrodes, Soldering Coppers and Flux, Torches, Welding Rod. Sight Feed Generator Co., Richmond, Ind.

**SF-Victor**—Torches. Oxy-Acetylene Welding Equipment. Sight Feed Generator Co., Richmond, Ind.

**S. I. S.**—Cement. Barrett Co., New York.

**S-M**—Air Conditioning Units, Furnaces. Scott-Newcomb, Inc., St. Louis, Mo.

**Safrol**—Controls. Penn Electric Switch Co., Goshen, Ind.

**St. Louis**—Stoker. Ormsby-Gray Combustion Service, Inc., St. Louis, Mo.

**Saf-ty**—Mallets. Martin Bersted Co., Chicago, Ill.

**Salmo**—Cement, Insulation, Pipe Coverings. Sall Mountain Co., Chicago, Ill.

**Samco**—Cement. Standard Asbestos Mfg. Co., Chicago, Ill.

**Sampsel**—Time Switches. Conco-Sampsel Stoker Corp., Mendota, Ill.

**Sanidair**—Humidifiers. U. S. Air Conditioning Corp., Minneapolis, Minn.

**Sanitary**—Furnaces. Smuck-Thiele Co., Indianapolis, Ind.

**Satis-Fyre**—Oil Burners. Shedlov Oil Burners, Inc., Minneapolis, Minn.

**Savage**—Stokers. Model Mfg. Co., Richmond, Va.

**Sav-T-Heat**—Air Conditioning Furnaces. C. A. Dunham Co., Chicago, Ill.

**Schmidt**—Soldering and Brazing Torches. Minn-Kota Foundry & Mfg. Co., Fargo, N. D.

**Scroll-Pivoter**—Snips and Shears. Wiss & Sons Co., J., Newark, N. J.

**Scraplex**—Ventilators. L. J. Wing Mfg. Co., New York, N. Y.

**Sealdsheet**—Oil Burners. Caloroll Burner Corp., Hartford, Conn.

**Sealdslab**—Duct Insulation. Insulite Co., Minneapolis, Minn.

**Seal of Quality**—Roofing. Columbia Steel Co., San Francisco, Cal.

**Seal-Tite**—Roof Cement, Asbestos Paint. C. Arthur Miller & Son, Elmira, N. Y.

**Seamless**—Furnaces. Waterman-Waterbury Co., Minneapolis, Minn.

**Selectair**—Air Conditioning Oil Furnace. S. T. Johnson Co., Oakland, Cal.

**Self-Cleaning**—Furnaces. Moore Corp., Joliet, Ill.

**Selflock**—Furnace Pipe Fittings and Accessories. Milcor Steel Co., Milwaukee, Wis.

**Selfvulo**—Waterproofing Compounds, Duct Insulation, Paint. Self-Vulcanizing Rubber Co., Inc., Chicago.

**Sensitrol**—Electrical Relays. Weston Electrical Instrument Corp., Newark, N. J.

**Shield-Arc**—Welders. Lincoln Electric Co., Cleveland, O.

**Shower-Proof**—Paint. Calbar Paint & Varnish Co., Philadelphia, Pa.

**Shur-Lock**—Pipe. Berger Bros. Co., Philadelphia, Pa.

**Silcrome**—Sheets. Ludlum Steel Co., Watervliet, N. Y.

**Silent**—Furnace Blowers. Air Conditioning Equipment Co., Minneapolis.

**Silent Air**—Air Conditioning Units, Fans and Blades. Belanger Fan & Blower Co., Detroit, Mich.

**Silentair**—Air Conditioning Units, Blowers, Filters, Washers. Gehri Co., Tacoma, Wash.

**Silent-Auburn**—Air Conditioning Units Oil Burners, Furnaces. Auburn Burner Corp., Auburn, Ind.

**Silent Automatic**—Dampers, Louvers, Shutters. Airecon Industries, Inc., Detroit, Mich.

**Silero**—Air Conditioning Units, Fans, Louvers, Shutters. Aire-Folle Fan & Blower Company, Detroit, Mich.

**Silentblu**—Gas Burners. Beck Engineering Combustion Company, St. Louis.

**Sil-Phos**—Welding Rod. Handy & Harmon, New York, N. Y.

**Silver-Seal**—Aluminum Paint. Asphalt Products Co., Syracuse, N. Y.

**Simplex**—Humidifiers. Henry Kraker, Holland, Mich.

**Simplex**—Humidifiers. Sallada Mfg. Co., Minneapolis, Minn.

**Simplex**—Oil Burners. Pan American Engineering Corp., Ltd., Berkeley, Cal.

**Simplex**—Stoker. Stoker Products, Inc., Decatur, Ill.

**Simplex**—Weather Strips. American Metal Weather Strip Co., Grand Rapids, Mich.

**Sim-trol**—Smoke Pipe Draft Regulators. Simplex Mfg. Co., Fond du Lac, Wis.

**Sirocco**—Air Conditioning Units, Blowers, Fans, Grilles, Washers, Wheels. American Blower Corp., Detroit.

**Sixinone**—Air Conditioning Units, Coils. Handelan Washer Air Co., Minneapolis, Minn.

**Slip-Lock**—Blowers, Blower Wheels. Viking Air Conditioning Corp., Cleveland, O.

**Snaplok**—Furnace and Stove Pipe. Reeves Steel & Mfg. Co., Dover, Ohio.

**Snug-Fit**—Coils. Hotstream Heater Co., Cleveland, O.

**Solar**—Furnaces. American Foundry & Furnace Co., Bloomington, Ill.

**Solar Comfort**—Air-Conditioning and Warm Air Furnaces. "Home Comfort" Furnace & Mfg. Co., St. Louis.

**Sound - Pruf**—Vibration Eliminating Bases. W. D. Fabling Co., Los Angeles, Cal.

**SpecO**—Soldering Flux. Pfanstiehl Chemical Co., Waukegan, Ill.

**Speedage**—Belts. L. H. Gilmer Co., Philadelphia, Pa.

**Spee Dee**—Colls. Air Controls, Inc., Cleveland, O.  
**Sphinx**—Burners, Furnaces, Humidifiers. C. L. Bryant Corp., Cleveland, O.  
**Spider Web**—Filters. Wilson & Co., Inc., Chicago, Ill.  
**Spiroidal**—Furnace Fans. Russell Electric Co., Chicago, Ill.  
**Spraymaker**—Humidifiers. Lennox Furnace Co., Marshalltown, Iowa.  
**Spra-Rite**—Nozzles. Binks Mfg. Co., Chicago, Ill.  
**Sprincolite**—Pulleys. American Pulley Co., Philadelphia, Pa.  
**Springair**—Air Conditioning Units. S. M. Howes Co., Charlestown, Boston.  
**Stable-Arc**—Arc Welding Electrodes, Arc Welders. Lincoln Electric Co., Cleveland, O.  
**Stainweld**—Arc Welding Electrodes. Lincoln Electric Co., Cleveland, O.  
**Stamco**—Furnace Pipe, Fittings. Cincinnati Stamping Co., Cincinnati, O.  
**Standard**—Furnaces. Aladdin Heating Corp., Oakland, Cal.  
**Standard**—Furnaces. Home Furnace Co., Holland, Mich.  
**Standard**—Furnaces, Heaters. Farris Furnace Co., Springfield, Ill.  
**Star**—Furnaces. Arcweld Mfg. Co., Inc., Seattle, Wash.  
**Star**—Solder. Eagle-Picher Lead Co., Cincinnati, O.  
**Star**—Soldering Furnaces. Burgess Soldering Furnace Co., Columbus, O.  
**Star**—Ventilators. Merchant & Evans Co., Philadelphia, Pa.  
**Stearns**—Registers. Springman Metal Specialty Co., Detroit, Mich.  
**Sterling**—Washers. Texo Sales & Mfg. Co., Cincinnati, O.  
**Ster-Na-Man**—Smoke Pipe Fittings and Accessories. A. G. Brauer Supply Co., St. Louis, Mo.  
**Stewart**—Furnaces. Fuller-Warren Co., Milwaukee, Wis.  
**Stoker-King**—Stokers. Stokers Incorporated, Detroit, Mich.  
**Stoker-Ola**—Stokers. Advance Appliance Co., Peoria, Ill.  
**Stoker "X"**—Stokers. Perfectaire Corp., Baltimore, Md.  
**Stokobilt**—Air Conditioning and Gravity Furnaces. American Foundry & Furnace Co., Bloomington, Ill.  
**Stokol**—Stokers. Schwitzer-Cummins Co., Indianapolis, Ind.  
**Stokolair**—Air Conditioning Units, Blower-Filter Units. Schwitzer-Cummins Co., Indianapolis, Ind.  
**Stowe**—Stokers. Johnston & Jennings Co., Cleveland, O.  
**Streamaire**—Coils. Young Radiator Co., Racine, Wis.  
**Stronghold**—Flat belts. J. E. Rhoads & Sons, Philadelphia, Pa.  
**Sunbeam**—Air Conditioning Units, Blower-Filter Units, Direct Expansion Coils, Refrigerating Compressors, Furnaces Stoker-Fired Furnaces, Heaters. Fox Furnace Co., Elyria, O.  
**Sunnyaire**—Air Conditioning Units, Blower-Filter Units, Furnaces, Heaters. Texo Sales & Mfg. Co., Cincinnati, O.  
**Sunrise**—Oil Burners. Kais Sunrise Works, Detroit, Mich.  
**Super**—Fans. Holtum Mfg. Co., Freeport, Ill.  
**Super**—Hangers and Fittings. Royal-Apex Mfg. Corp., Brooklyn, N. Y.  
**Super**—Roof Flashing. Eagle-Picher Lead Co., Cincinnati, O.  
**Super Metal**—Steel Sheets. Superior Sheet Steel Co., Div. Continental Steel Corp., Canton, O.  
**Superfex**—Oil Burners, Furnaces, Heaters. Perfection Stove Co., Cleveland.  
**Super Firma**—Gravity Roof Ventilators. W. F. Hirschman Co., Inc., Buffalo.

**Superior**—Air Conditioning Units, Furnaces. Pacific Gas Radiator Co., Los Angeles, Cal.  
**Superior**—Filters, Ventilators. American Foundry & Furnace Co., Bloomington, Ill.  
**Superior**—Furnaces. Richardson & Boynton Co., New York, N. Y.  
**Super Red Streak**—Furnace Vacuum Cleaners. National Super Service Co., Toledo, O.  
**Super Suction**—Furnace Vacuum Cleaners. National Super Service Co., Toledo, O.  
**Super - Thermo**—Stucco for refractory maintenance (Refractory Lining Mix). Chicago Fire Brick Co., Chicago, Ill.  
**Super-X**—Metal Shingles. Gulf States Steel Co., Birmingham, Ala.  
**Supreme**—Furnaces. American Furnace & Foundry Co., Milan, Mich.  
**Supreme**—Furnaces, Heaters. Agricola Furnace Co., Inc., Gadsden, Ala.  
**Suredrane**—Roofing. Reeves Steel & Mfg. Co., Dover, Ohio.  
**Surelok**—Furnace and Stove Pipe. Reeves Steel & Mfg. Co., Dover, Ohio.  
**Surety**—Furnaces. "Home Comfort" Furnace & Mfg. Co., St. Louis, Mo.  
**Surfaceol**—Waterproofing Compound. Gerard Chemical Co., Elizabeth, N. J.  
**Symonds**—Registers. Liberty Foundry Co., St. Louis, Mo.  
**Synchron**—Stoker Controls, Relays, Switches, Timers. Industrial Engineering Corp., Evansville, Ind.  
**Syox**—Registers. Liberty Foundry Co., St. Louis, Mo.  
**Syphon-Air**—Ventilators. F. Meyer & Bro. Co., Peoria, Ill.

## T

**Tafco**—Air Filters. Tuttle Air Filter Co., Inc., Louisville, Ky.  
**Tag**—Psychrometers, Recorders, Time Switches, Thermometers, Thermostats, Valves. C. J. Tagliabue Mfg. Co., Brooklyn, N. Y.  
**Tag-Mono**—Flue Gas Analyzers. C. J. Tagliabue Mfg. Co., Brooklyn, N. Y.  
**Tag Snapon**—Thermostats. C. J. Tagliabue Mfg. Co., Brooklyn, N. Y.  
**Tamco**—Ventilators, Wood Faces. Tiffin Art Metal Co., Tiffin, O.  
**Tanco**—Sound Deadening Paint. Thompson & Co., Pittsburgh, Pa.  
**Tannate**—Flat Belts. J. E. Rhoads & Sons, Philadelphia, Pa.  
**Tatroweld**—Arc Welders. Tatrow Brothers, Inc., Decorah, Iowa.  
**Taylor**—Stokers. Advanced Engineering Co., Philadelphia, Pa.  
**Technotrol**—Electric Clock Thermostat. White Mfg. Co., St. Paul, Minn.  
**Temlok**—Insulation. Armstrong Cork Products Co., Lancaster, Pa.  
**Tempered-Aire**—Furnaces. Gar Wood Industries, Inc., Detroit, Mich.  
**Temtrol**—Thermostats. Penn Electric Switch Co., Goshen, Ind.  
**Texrope**—V-Belts. Allis-Chalmers Mfg. Co., Milwaukee, Wis.  
**Tharoco**—Furnace Cement. The Armstrong Company, Detroit, Mich.  
**Themair**—Furnaces. New York Blower Co., Chicago, Ill.  
**Thermidair**—Air Conditioning Units. E. K. Campbell Heating Co., Kansas City, Mo.  
**Thermo-Drip**—Humidifiers. Automatic Humidifier Co., Cedar Falls, Ia.  
**Thermofill**—Insulation. United States Gypsum Co., Chicago, Ill.  
**Thermogas**—Air Conditioning Units. Beck Engineering Combustion Company, St. Louis, Mo.

**Thermogrip**—Soldering Coppers. Ideal Commutator Dresser Co., Sycamore, Ill.  
**Thermolator**—Heaters. Pacific Gas Radiator Co., Los Angeles, Cal.  
**Thermolier**—Air Conditioning Units. Grinnell Co., Inc., Providence, R. I.  
**"The Pacific"**—Furnaces. W. W. Rosebraugh Co., Salem, Ore.  
**Thermo**—Stoker-Fired Furnace. American Furnace Co., St. Louis, Mo.  
**Thermopaste**—Plastic Fire Brick. Chicago Fire Brick Co., Chicago, Ill.  
**Thermofuel**—Air Conditioning Units. Beck Engineering Combustion Company, St. Louis, Mo.  
**Thermus**—Gravity Furnaces. McPherson Furnace & Supply Co., Portland, Ore.  
**Thor**—Arc Welders. Commonwealth Mfg. Corp., Cincinnati, O.  
**370**—Paints. Thompson & Co., Pittsburgh, Pa.  
**Threplex**—Flashing. Chase Brass & Copper Co., Inc., Waterbury, Conn.  
**Thriftsteel**—Furnaces. Round Oak Co., Dowagiac, Mich.  
**Throway**—Filters. American Air Filter Co., Inc., Louisville, Ky.  
**Tik Wheat**—Pipe Covering Paste. Clark Stak-O Corp., Rochester, N. Y.  
**Tillers - all - Welded**—Furnaces. Iowa Foundry Co., Sioux City, Iowa.  
**Timercold**—Time Clock. Mercoid Corp., Chicago, Ill.  
**Timetrol**—Switches. Penn Electric Switch Co., Goshen, Ind.  
**Tin-Ezy**—Soldering Flux. Alumaweld Co. of America, Chicago, Ill.  
**Tin Loy**—Tinning Compounds. Eagle-Picher Lead Co., Cincinnati, O.  
**Tinol**—Compounds and Soldering Flux. American Solder & Flux Co., Philadelphia, Pa.  
**Titan**—Furnaces. Standard Fdry. & Furnace Co., DeKalb, Ill.  
**Titelock**—Fittings and Accessories for Conductor, Eaves Trough and Gutter, Furnace Pipe; Stove Pipe; Copper Roofing; Metal Shingles and Tile. Milcor Steel Co., Milwaukee.  
**Tobin Bronze**—Welding Rod. American Brass Co., Waterbury, Conn.  
**Tomb Brand**—Insulation. Barrett Co., New York City.  
**Toncan**—Plates, Ridge Rolls and Ridging, Roofing, Sheets. Republic Steel Corp., Cleveland, O.  
**Toolweld**—Arc Welding Electrodes. Lincoln Electric Co., Cleveland, O.  
**Toridheat**—Oil Burners. Cleveland Steel Products Corp., Cleveland, O.  
**Tornado**—Furnace Vacuum Cleaners. Breuer Electric Mfg. Co., Chicago.  
**Torpedo**—Skylights. Milcor Steel Co., Milwaukee, Wis.  
**Torrid**—Soldering Furnaces and Torches. Geo. W. Diener Mfg. Co., Chicago.  
**Torrid**—Furnaces. Beck Engineering Combustion Company, St. Louis, Mo.  
**Torrid Zone**—Furnaces, Heaters. Lennox Furnace Co., Marshalltown, Ia.  
**Townley**—Cabinet Heaters. Independence Stove & Furnace Co., Independence, Mo.  
**Torrid-Zone Aire-Flo**—Stoker-Fired Air Conditioning Furnace. Lennox Furnace Co., The, Marshalltown, Iowa.  
**Triple Drain**—Channel Roofing. Republic Steel Corp., Cleveland, Ohio.  
**Triplex**—Furnaces. Home Furnace Co., Holland, Mich.  
**Triplife**—Furnaces. Williamson Heater Co., Cincinnati, O.  
**Tropico**—Humidifiers. Roberts-Hamilton Co., Minneapolis, Minn.  
**Tungar**—Arc Welder. General Electric Co., Schenectady, N. Y.  
**Turtle**—Roofing. Samuel Cabot, Inc., Boston, Mass.



**20th Century**—Fan Bearings. Roller Bearing Co. of America, Trenton, N. J.

**Twin-Fyre**—Oil Burners. Aldrich Co., Peoria, Ill.

**Twin Zephyr**—Humidifier. Mald-O'Mist, Inc., Chicago, Ill.

**Tymit**—Time Switches. Tork Clock Co., Inc., Mt. Vernon, N. Y.

## U

**U. S.**—Blowers, Skylights and Roof Fan Ventilators. J. K. Mohler Co., Ephrata, Pa.

**U. S. G.**—Roofing. United States Gypsum Co., Chicago, Ill.

**USS**—Roofing, Sheets. Carnegie-Illinois Steel Corp., Pittsburgh, Pa.

**U-Loy**—Sheets. Republic Steel Corp., Cleveland, O.

**Uniblade**—Blowers. Autovent Fan & Blower Co., Chicago, Ill.

**Unicool**—Air Conditioning Units. Betz Unit Air Cooler Co., Kansas City.

**Unified**—Air Conditioning Units. Hugo Mfg. Co., Duluth, Minn.

**Uni-Fin**—Warm Air Registers. Barber-Colman Co., Rockford, Ill.

**Unilectric**—Fans. Midwest Ventilating Works, Milwaukee, Wis.

**Unimatio**—Air Filters. American Air Filter Co., Inc., Louisville, Ky.

**Unishear**—Power Shears. Stanley Electric Tool Div., The Stanley Works, New Britain, Conn.

**Unistoker**—Stokers. Detroit Stoker Co., Detroit, Mich.

**Unitor**—Cabinet Heaters. American Gas Products Corp., New York, N. Y.

**Universal**—Air Filters. Hugo Mfg. Co., Duluth, Minn.

**Universal**—Blowers, Fans. Ilg Electric Ventilating Co., Chicago, Ill.

**Universal**—Dial Damper. Parker-Kalon Corp., New York City.

**Universal**—Hand Snips and Shears. Rupp Forge & Shear Co., Cleveland.

**Universal**—Pillow Blocks. Randall Graphite Products Corp., Chicago.

**Unzld**—Damper Quadrants. Parker-Kalon Corp., New York, N. Y.

**Upson**—Rivets. Republic Steel Corp., Cleveland, O.

**U. S. S. Columbia**—Roofing, Sheets. Columbia Steel Co., San Francisco.

**Utilus**—Kitchen Exhaust and Ventilating Fans. W. F. Hirschman Co., Inc., Buffalo, N. Y.

## V

**"V" Crimp**—Roofing. W. R. Ames Co., San Francisco, Cal.

**Vacalox**—Damper Regulators. Young Regulator Co., Cleveland, Ohio.

**Vacu-Draft**—Blowers. Muncie Gear Works, Inc., Muncie, Ind.

**Valley Forge**—Cement. Ehret Magnesia Mfg. Co., Valley Forge, Pa.

**Vaporator**—Humidifiers. Rudy Furnace Co., Dowagiac, Mich.

**Varipitch**—Fans. Torrington Mfg. Co., Torrington, Conn.

**Velometer**—Anemometers. Illinois Testing Laboratories, Inc., Chicago, Ill.

**Ventura**—Fans, Ventilators. American Blower Corp., Detroit, Mich.

**Vernalloy**—Furnace Metal. Mt. Vernon Furnace & Mfg. Co., Mt. Vernon, Ill.

**Vernois**—Furnaces. Mt. Vernon Furnace & Mfg. Co., Mt. Vernon, Ill.

**Verson**—Brakes, Punches. Allsteel Press Co., Inc., Chicago, Ill.

**Vibraork**—Bases. Armstrong Cork Products Co., Lancaster, Pa.

**Victor**—Air Conditioning Units, Blower-Filter Units, Furnaces, Humidifiers, Stokers. Hall-Neal Furnace Co., Indianapolis, Ind.

**Victor**—Portable Electric Drills. Stanley Electric Tool Div., Stanley Works, New Britain, Conn.

**Victor**—Regulators. Safe Automatic Heat Control Co., Detroit, Mich.

**Victorairs**—Air Conditioning Furnaces, Units, Furnaces. Hall-Neal Furnace Co., Indianapolis, Ind.

**Victory**—Oil Burners. Caloroll Burner Corp., Hartford, Conn.

**Vik-Air**—Air Conditioning Units, Blowers and Blower Units, Humidifiers. Viking Air Conditioning Corp., Cleveland, O.

**Vim**—Belts. E. F. Houghton & Co., Philadelphia, Pa.

**Vim Tred**—Belts. E. F. Houghton & Co., Philadelphia, Pa.

**Vortex**—Furnace Vacuum Cleaners. B. F. Sturtevant Co., Hyde Park, Boston, Mass.

**Vulcanite**—Roofing, Roofing Cement. Certain-teed Products Corp., New York, N. Y.

**Vulcatex**—Caulking and Glazing Compounds. A. C. Horn Co., Long Island City, N. Y.

**Vulco**—V-type Belts. Gates Rubber Co., Denver, Colo.

## W

**Wafer**—Filters. American Air Filter Co., Inc., Louisville, Ky.

**Warco**—Refractories. Walsh Refractories Corp., St. Louis, Mo.

**Waterbase**—Furnaces, Heaters. Farris Furnace Co., Springfield, Ill.

**Water-Boy**—Humidifier Valves. Mald-O-Mist, Inc., Chicago, Ill.

**Waterseal**—Cement, Paint. Thompson & Co., Pittsburgh, Pa.

**Watertender**—Humidifier Valve. J. L. Skuttle Co., Detroit, Mich.

**Watson**—Furnaces, Heaters. Floral City Co., Monroe, Mich.

**Wearweld**—Arc Welding Electrodes. Lincoln Electric Co., Cleveland, O.

**Wearwell**—Paint. Thompson & Co., Pittsburgh, Pa.

**Weathermaker**—Air Conditioning Units. Carrier Corp., Syracuse, N. Y.

**Weathermaster**—Air Conditioning Units, Boiler Type. Carrier Corp., Syracuse, N. Y.

**Weather Master**—Air Conditioning Units. U. S. Pressed Steel Products Co., Kalamazoo, Mich.

**Weatherseal**—Insulation. Sprayo-Flake Co., Chicago, Ill.

**Weather Stabilizer**—Air Conditioning Units, Furnaces, Heaters. Des Moines Steel Furnace Co., Des Moines, Ia.

**Weatherwood**—Insulation. United States Gypsum Co., Chicago, Ill.

**Wedgbelt**—Pulleys. American Pulley Co., Philadelphia, Pa.

**Weir**—Air Conditioning Units, Furnaces, Heaters, Stokers. Meyer Furnace Co., Peoria, Ill.

**Weisco**—Skylight Lifts. H. Weiss & Co., New York, N. Y.

**Weldit**—Torches, Oxy-Acetylene Welding Equipment. Welding Apparatus Co., Chicago, Ill.

**Weldite**—Electrodes and Welding Rod. Chicago Steel & Wire Co., Chicago.

**Weldon**—Air Conditioning Coal Furnaces. McPherson Furnace & Supply Co., Portland, Ore.

**Wellsville Savage**—Fire Brick. Chicago Fire Brick Co., Chicago, Ill.

**Wesco**—Furnaces. John Westwick & Son, Inc., Galena, Ill.

**Western King**—Furnaces. Independence Stove & Furnace Co., Independence, Mo.

**Westotherm**—Thermometers. Weston Electrical Instrument Corp., Newark, N. J.

**Westrite**—Furnaces. Western Furnaces, Inc., Tacoma, Wash.

**Wheco**—Oil Burners. Westchester Home Equipment Co., Inc., Bronx, N. Y.

**Whirlator**—Oil Burners. Norge Heating & Conditioning Div., Borg-Warner Corp., Detroit, Mich.

**White Flash**—Electrodes. Central Steel & Wire Co., Chicago, Ill.

**Whitney**—Stokers. Apex Tool Co., Inc., Bridgeport, Conn.

**Wichert**—Furnaces, Heaters. St. Clair Foundry Corp., Centralia, Ill.

**Wildergloss**—Smoke and Stove Pipe and Fittings. Wilder Mfg. Co., Niles, Ohio.

**Wilson**—Arc Welders. Air Reduction Sales Co., New York, N. Y.

**Winair**—Fans. W. F. Hirschman Co., Inc., Buffalo, N. Y.

**Wind Electric**—Roof Ventilators. W. F. Hirschman Co., Inc., Buffalo, N. Y.

**Windowstat**—Condensation Control. Julian P. Friez & Sons, Inc., Baltimore.

**Wind-O-Vane Jr.**—Kitchen Exhaust Fans. B. F. Sturtevant Co., Hyde Park, Mass.

**Winner**—Registers. Auer Register Co., Cleveland, O.

**Winter-Chaser**—Air Conditioning Units, Furnaces, Heaters. Campbell Heating Co., Des Moines, Ia.

**Winter King**—Furnaces. McPherson Furnace & Supply Co., Portland, Ore.

**Wissco**—Grilles. Wickwire Spencer Steel Co., New York City.

**Wizard**—Furnaces. Agricola Furnace Co., Inc., Gadsden, Ala.

**Wolverine**—Fans, Blades, Ventilators and Washers. Belanger Fan & Blower Co., Detroit, Mich.

**Wolverine**—Weather Strips. American Metal Weather Strip Co., Grand Rapids, Mich.

## X

**XL**—Metal Windows. Herrmann & Grace Co., Brooklyn, N. Y.

**X-L-All**—Coils, Furnaces. Deshler Foundry & Machine Works, Deshler, O.

**Xit**—Ventilators. Iona Ventilator Co., Inc., Philadelphia, Pa.

## Y

**Yager's**—Flux. Alex R. Benson Co., Inc., Hudson, N. Y.

**Yankee**—Damper Clips and Tips. S. M. Howes Co., Charlestown, Boston.

**Yoloy**—Alloy Plates and Sheets. Youngstown Sheet & Tube Co., Youngstown, O.

## Z

**Zeph-O-Lator**—Air Conditioning Furnaces. Century Engineering Corp., Cedar Rapids, Ia.

**Zephyr-air**—Fans. Gas City Glass Co., Gas City, Ind.

**Zero**—Furnace Cement and Refractories. Standard Fuel Engineering Co., Detroit, Mich.

**Zincoat**—Sheets. Tennessee Coal, Iron & Railroad Co., Birmingham, Ala.

**Z-Ro King**—Furnaces. Oakland Foundry Co., Belleville, Ill.



Section of  
**American Artisan**  
1938 DIRECTORY OF WARM AIR HEATING, RESIDENTIAL  
AIR CONDITIONING AND SHEET METAL PRODUCTS

[Section 3—MANUFACTURERS' ADDRESSES]

**A**

A-C Mfg. Co., Inc., 417 Sherman Ave., Pontiac, Ill.  
Abbott Mfg. Co., Box 150, Painesville, O.  
● Accurate Mfg. Works, 2432 Milwaukee Ave., Chicago, Ill.  
Accurate Metal Weather Strip Co., 216 E. 26th St., New York City.  
Ace Engineering Co., 1735 W. 31st St., Chicago, Ill.  
Acer & Whedon, Inc., Commercial St., Medina, N. Y.  
Acme Asbestos Covering & Flooring Co., 218 Elizabeth St., Chicago, Ill.  
● Acme Electric Welder Co., 5619 Pacific Blvd., Huntington Park, Cal.  
● Acme Heating & Ventilating Co., 4224 S. Lowe Ave., Chicago, Ill.  
Acme Oil Burner Co., Inc., 210 Third Ave., S. W., Cedar Rapids, Ia.  
Acme Refining Co., W. 56th & W. & L. E. Ry., Cleveland, O.  
Acme Tin Plate & Roofing Supply Co., 10th & York St., Philadelphia, Pa.  
Acorn Refining Co., 8001 Franklin Blvd., Cleveland, Ohio.  
Adams Co., E. 4th St. Ext., Dubuque, Ia.  
Adjustable Bearing Plate Co., 11 Rutger St., St. Louis, Mo.  
Advance Aluminum Castings Corp., 2742 W. 36th Pl., Chicago, Ill.  
● Advance Appliance Co., 808-810 Washington St., Peoria, Ill.  
Advance Fan & Blower Co., 3428 Bagley, Detroit, Mich.  
Advanced Engineering Co., Aramingo Ave. & Cumberland St., Philadelphia, Pa.  
Advanced Refrigerating Systems Co., 33rd & Arch Sts., Philadelphia, Pa.  
Aeolus Dickinson, 3332-52 S. Artesian Ave., Chicago, Ill.  
● Aerofin Corp., 306 S. Geddes St., Syracuse, N. Y.  
Aeroll Burner Co., Inc., Park Ave. at 13th St., West New York, N. J.  
Aerovent Fan Co., 710 E. Ash St., Piqua, O.  
Agnew Electric Welder Co., 64 Thomas St., Milford, Mich.  
Agricola Furnace Co., Inc., North 12th St., Gadsden, Ala.  
Ahlberg Bearing Co., 3025 W. 47th St., Chicago, Ill.  
Air Conditioning Equipment Co., 301 N. Seventh St., Minneapolis, Minn.  
● Air Conditioning Products Co., 1230 Eighteenth St., Detroit, Mich.  
Air Conditioning Supply Co., 1893 E. 55th St., Cleveland, O.  
● Air Controls, Inc., 1935 W. 114th St., Cleveland, O.  
Aircraft Mfg. Co., 418 E. First St., Dayton, Ohio.  
Air Devices Corp., 70 Britannia St., Meriden, Conn.  
Airecon Industries, 2648-2654 Botsford Ave., Detroit, Mich.  
Aire-Folle Fan & Blower Co., 4737 W. Vernor Highway, Detroit, Mich.  
Airgard Manufacturing Co., 609 N. La Salle St., Chicago, Ill.  
Airmaster Corp., 140 S. Dearborn St., Chicago, Ill.  
Air-Maze Corp., 813 Huron Road, Cleveland, O.  
Air Reduction Sales Co., 60 E. 42nd St., New York City.  
Airtemp, Inc., Leo St., Dayton, O.  
Airtherm Mfg. Co., 1474 S. Vandeventer Ave., St. Louis, Mo.  
Aladdin Heating Corp., 5107 Broadway, Oakland, Cal.  
Alco Valve Co., Inc., 2628 Big Bend Blvd., St. Louis, Mo.  
● Aldrich Co., 209 Hamilton St., Peoria, Ill.  
Aldrich Pump Co., Foot of Pine St., Allentown, Pa.  
Alexander Bros., 406 N. 3rd St., Philadelphia, Pa.  
Alfol Insulation Co., 155 E. 44th St., New York City.  
Allegheny Steel Co., Brackenridge, Pa.  
Allen-Bradley Co., 1335 S. First St., Milwaukee, Wis.  
● Allen Corp., 9752 Erwin, Detroit, Mich.  
Allen Co., L. B., 6719 Bryn Mawr Ave., Chicago, Ill.  
Allis-Chalmers Mfg. Co., Milwaukee, Wis.  
Allis Co., Louis, 427 E. Stewart St., Milwaukee, Wis.  
Allmetal Weatherstrip Co., 229 W. Illinois St., Chicago, Ill.  
All States Roofers Equipment & Material Co., 2107 W. Lake St., Chicago, Ill.  
Allsteel Press Co., Inc., 93rd & Kenwood Ave., Chicago, Ill.  
Alter-Arc Mfg. Co., 209 B St., Lawton, Okla.  
Alton Mineral Wool Co., P. O. Box 263, Alton, Ill.  
Alumaweld Co. of America, 2442-44 South Parkway, Chicago, Ill.  
Aluminum Company of America, 801 Gulf Bldg., Pittsburgh, Pa.

American Air Conditioning Co., 2831 Thirteenth Ave., Minneapolis, Minn.  
American Air Conditioning Corp., P. O. Box 29, Sebastopol, Cal.  
● American Air Filter Co., Inc., 113 Central Ave., Louisville, Ky.  
American Barlock Co., Inc., 36-32 38th St., Long Island City, N. Y.  
American Blower Corp., 6000 Russell St., Detroit, Mich.  
● American Brass Co., 414 Meadow St., Waterbury, Conn.  
American Chemical Paint Co., Brookside Ave., Ambler, Pa.  
American Chain Co., Inc., 929 Connecticut Ave., Bridgeport, Conn.  
American Coal Burner Co., 155 E. Superior St., Chicago, Ill.  
American Coolair Corp., 3604 Mayflower St., Jacksonville, Fla.  
American Coppercote, Inc., 132 Classon Ave., Brooklyn, N. Y.  
American Flange & Mfg. Co., Inc., 1901 R. C. A. Bldg., Radio City, New York City.  
● American Foundry & Furnace Co., 915 E. Washington St., Bloomington, Ill.  
American Furnace Co., 2719-31 Delmar Blvd., St. Louis, Mo.  
American Furnace & Foundry Co., Milan, Mich.  
● American Gas Products Corp., 40 W. 40th St., New York City.  
American Hair & Felt Co., 222 N. Bank Dr., Chicago, Ill.  
American Instrument Co., Silver Springs, Md.  
American-Larson Ventilating Co., 1004 Keystone Bank Bldg., Pittsburgh, Pa.  
American Machine Products Co., 207-11 Market St., Marshalltown, Ia.  
American-Marsh Pumps, Inc., 60 Capital Ave., N. E. Battle Creek, Mich.  
American Metal Weather Strip Co., 144 N. Division Ave., Grand Rapids, Mich.  
American Nickeloid Co., 1505 Second St., Peru, Ill.  
American Oil Burners & Heating Utilities, 4511 Fourth Ave., Brooklyn, N. Y.  
American Pulley Co., 4200 Wissahickon Ave., Philadelphia, Pa.  
American Radiator Co., 40 W. 40th St., New York City.  
● American Rolling Mill Co., 730 Curtis St., Middletown, O.  
American Screw Co., 1934 Thurston Ave., Providence, R. I.  
American Solder & Flux Co., 4519 Wayne Ave., Philadelphia, Pa.  
American Sheet Metal Works, 331 N. Alexander, New Orleans, La.  
American Steel Co., 1330 Park Bldg., Pittsburgh, Pa.  
American Steel & Wire Co., 208 S. La Salle St., Chicago, Ill.  
American Transformer Co., 192 Emmet St., Newark, N. J.  
● American Warming & Ventilating Co., Toledo, Ohio.  
American Wood Register Co., Novelty & Walnut Sts., Plymouth, Ind.  
American Zinc Products Co., Greencastle, Ind.  
Ames Co., W. R., 150 Hooper St., San Francisco, Cal.  
Amirton Co., 60 E. 42nd St., New York City.  
Anchor Post Fence Co., Eastern Ave. & Kane St., Baltimore, Md.  
Anchor Stove and Range Co., Third & Culbertson, New Albany, Ind.  
Anderson Mfg. Co., 511 3rd, Des Moines, Ia.  
Anderson Products, Inc., 17 Tudor St., Cambridge, Mass.  
Andes Range & Furnace Corp., 117 Evans St., Geneva, N. Y.  
Andrews Lead Co., Inc., 30-48 Greenpoint Ave., Long Island City, N. Y.  
Anemostat Corporation of America, 10 East 39th St., New York City.  
Angell Nail & Chaplet Co., 4580 E. 71st St., Cleveland, O.  
Annis, Emmett F., 1515 Gardena St., Glendale, Cal.  
● Anthracite Industries, Inc., Chrysler Building, New York City.  
Anti-Corrosive Metal Products Co., Inc., Castleton-on-Hudson, N. Y.  
Antigo Building Supply Co., Antigo, Wis.  
Apex Rotarex Corp., 1070 E. 152nd St., Cleveland, Ohio.  
Apex Tool Co., Inc., 50 Remer St., Bridgeport, Conn.

● Advertisement in this issue. See Index to Advertisers, page 102

- Apollo Steel Co., 609-617 Warren Ave., Apollo, Pa.  
 Arco Vacuum Corp., 40 W. 40th St., New York City.  
 Arcweld Mfg. Co., Inc., 3469 Third Ave. W., Seattle, Wash.  
 •Arex Co., 333 N. Michigan Ave., Chicago, Ill.  
 Armstrong-Blum Mfg. Co., 5700 Bloomingdale Rd., Chicago, Ill.  
 •Armstrong Co., South & Post St., Detroit, Mich.  
 Armstrong Cork Products Co., 992 Concord St., Lancaster, Pa.  
 •Armstrong Furnace Co., 1649 Olentangy River Rd., Columbus, O.  
 Asphalt Products Co., Eastwood Sta., Syracuse, N. Y.  
 Associated Air Conditioning Corp., 3339 Lindell, St. Louis, Mo.  
 Associated Heater Parts Co., 3101 Wentworth Ave., Chicago, Ill.  
 •Atcheson Glass Co., T. J., 951 Main St., Buffalo, N. Y.  
 Athens Plow Co., Athens, Tenn.  
 Athey Co., 1923 S. Calumet, Chicago, Ill.  
 Atlas Bolt & Screw Co., 1130 Ivanhoe Rd., Cleveland, O.  
 Atlas Heating & Ventilating Co., Ltd., 557 4th St., San Francisco, Cal.  
 Atlas Valve Co., 282 South St., Newark, N. J.  
 Auburn Burner Corp., Auburn, Ind.  
 Auburn Automobile Co., Air Cond. Div., Sales Office, 2426 Michigan Ave., Chicago, Ill. Factory, Connerville, Ind.  
 Auburn Stoker Co., Auburn, Ind.  
 •Auer Register Co., 3608 Payne Ave., Cleveland, O.  
 •Autocrat Oil Burner Corp., 100 East Ave., N. W., Cedar Rapids, Ia.  
 Auto-Heat Corporation, 3111 W. 66th St., New York City.  
 Automatic Burner Corp., 1823 Carroll Ave., Chicago, Ill.  
 •Automatic Gasflux Co., Frankfort Ave., Cleveland, O.  
 •Automatic Humidifier Co., 18th & Main Sts., Cedar Falls, Ia.  
 •Automatic Products Co., 2452 N. 32nd St., Milwaukee, Wis.  
 Automatic Stoker Corp., Indianapolis, Ind.  
 Automatic Switch Co., 154 Grand St., New York City.  
 Autovent Fan & Blower Co., 1807-19 N. Kostner Ave., Chicago, Ill.

## B

- Bacharach Industrial Instrument Co., 7000 Bennett St., Pittsburgh, Pa.  
 Bache Co., Semon, Greenwich & Morton Sts., New York City.  
 Badger Mfg. Co., 106 N. Frances St., Madison, Wis.  
 Bailey Meter Co., 1050 Ivanhoe Rd., Cleveland, O.  
 Baker Furnace & Cleaner Mfg. Co., 2505 Albion St., Toledo, O.  
 •Baker Ice Machine Co., Inc., 1509 Evans St., Omaha, Nebr.  
 Baldor Electric Co., 4353 Duncan Ave., St. Louis, Mo.  
 Ballard, Inc., Arthur H., 535 Commonwealth Ave., Boston, Mass.  
 Ballofett Dies & Nozzle Co., Inc., 45-51 Adams St., Guttenberg, N. J.  
 Bangor-Washington Slate Co., Bangor, Pa.  
 Banner Repair Parts Co., 103 E. Indianola Ave., Youngstown, Ohio.  
 Barber Co., Inc., 1600 Arch St., Philadelphia, Pa.  
 •Barber-Colman Co., River & Loomis Sts., Rockford, Ill.  
 •Barber Gas Burner Co., 3704 Superior Ave., Cleveland, O.  
 •Barclay, Inc., Robt., 128 N. Peoria St., Chicago, Ill.  
 Bard Mfg. Co., Evansport Road, Bryan, Ohio.  
 Bardes Range & Foundry Co., E. H., 2619 Colerain Ave., Cincinnati, O.  
 Barnes Metal Products Co., 4425 W. 16th St., Chicago, Ill.  
 Barrett Co., 40 Rector St., New York City.  
 Barrett Mfg. Co., 308 S. West Blvd., Kansas City, Mo.  
 Barrett Engineers, 1322 Warrenville Center Rd., Cleveland Heights, O.  
 Barry Furnace Co., 208 N. B St., Hamilton, O.  
 •Bartlett Mfg. Co., 3003 E. Grand Blvd., Detroit, Mich.  
 Bastian-Blessing Co., 240 E. Ontario St., Chicago, Ill.  
 Bayer Co., A. J., Slauson & Santa Fe Aves., Los Angeles, Cal.  
 Bayley Blower Co., 1817 S. 66th St., Milwaukee, Wis.  
 Beacon-Morris Corp., Boston, Mass.  
 •Bead Chain Mfg. Co., 110 Mountain Grove St., Bridgeport, Conn.  
 Beatrice Steel Tank Mfg. Co., 700-710 S. 7th St., Beatrice, Nebr.  
 Beatty Machine & Mfg. Co., 932 150th St., Hammond, Ind.  
 Beck Engineering Combustion Company, 3033 Adams St., St. Louis, Mo.  
 Beckley Perforating Co., 315 North Ave., Garwood, N. J.  
 Bedard Mfg. Co., 1647 Hennepin Ave., Minneapolis, Minn.  
 •Belanger Fan & Blower Co., 1230 18th St., Detroit, Mich.  
 Bell & Gossett Co., 2000 Wallace St., Chicago, Ill.  
 Belmont Smelting & Refining Works, Inc., 341 Belmont Ave., Brooklyn, N. Y.  
 Bender Warrick Corp., 131 Pierce, Birmingham, Mich.  
 Benjamin Elec. Mfg. Co., Des Plaines, Ill.  
 Bennett Corp., W. M., 1109 Harney St., Omaha, Nebr.  
 Benson Co., Inc., Alex R., 1040 S. Bay Rd., Hudson, N. Y.  
 •Berger Bros. Co., 229-237 Arch St., Philadelphia, Pa.  
 Berger Mfg. Co., Div of Republic Steel Corp., 1033 Belden Ave., N. E., Canton, O.  
 Berger Mfg. Div. of Truscon Steel Co., Canton, O.  
 Bergstrom Mfg. Corp., Neenah, Wis.  
 Berns Specialty Company, 1015 W. Lake St., Chicago, Ill.

- Berns Co., Inc., Otto, 230 Lyell Ave., Rochester, N. Y.  
 Berryman Oil Burner Co., 1304 Washington Blvd., Chicago, Ill.  
 Bersted Co., Martin, 20 E. Jackson Blvd., Chicago, Ill.  
 Berry, Jr., F. E. & Co., Inc., Little Bldg., Boston, Mass.  
 Bertram Mfg. Co., 646 N. Michigan Ave., Chicago, Ill.  
 Bertsch & Co., Church St., Cambridge City, Ind.  
 Best Register Co., 2005 W. Oklahoma Ave., Milwaukee, Wis.  
 Bethlehem Foundry & Machine Co., W. Second St., Bethlehem, Pa.  
 Bethlehem Steel Co., Bethlehem, Pa.  
 Betz Unit Air Cooler Co., 6 W. Ninth St., Kansas City, Mo.  
 •Beverly Throatless Shear Co., 3009 W. 110th Pl., Chicago, Ill.  
 Biersach & Niedermeyer Co., 1937 N. Hubbard St., Milwaukee, Wis.  
 Bignall Co., 621-623 Main St., Medina, N. Y.  
 Binks Mfg. Co., 3114 Carroll Ave., Chicago, Ill.  
 Bird & Son, Inc., 163 Washington St., East Walpole, Mass.  
 Bishop & Babcock Sales Co., 4901 Hamilton Ave., Cleveland, O.  
 Bishop Humidifier Co., 8011 Dexter Blvd., Detroit, Mich.  
 Black & Decker Mfg. Co., Pennsylvania Ave., Towson, Md.  
 Bliss Co., E. W., 1420 Hastings St., Toledo, O.  
 Bluffton Mfg. Co., 433 W. Main Cross St., Findlay, O.  
 Blower Application Company, 918 N. Fourth St., Milwaukee, Wis.  
 Bodine Electric Co., 2272 W. Ohio St., Chicago, Ill.  
 Bollaert, M., 3936 Rhoda Ave., Oakland, Cal.  
 Bossert Corp., 1800 Lenox Ave., Utica, N. Y.  
 Bostwick-Goodell Co., Norwalk, O.  
 Braden Engineering, Inc., 896 Elmwood Ave., Providence, R. I.  
 Braden Mfg. Co., 431 N. 14th St., Terre Haute, Ind.  
 Brasco Mfg. Co., Harvey, Ill.  
 •Brauer Supply Co., A. G., 316 N. Third St., St. Louis, Mo.  
 •Bremil Mfg. Co., Box 1030, Erie Pa.  
 •Breuer Electric Mfg. Co., 865 Blackhawk St., Chicago, Ill.  
 Bridesburg Foundry Co., Tacony & Duncan Sts., Philadelphia, Pa.  
 Bridgeport Brass Co., E. Main St., Bridgeport, Conn.  
 Bridgeport Chain & Mfg. Co., 964 Crescent Ave., Bridgeport, Conn.  
 Bridgeport Screw Co., Bridgeport, Conn.  
 Brigham Oil Burner Co., 2915 Clark Ave., St. Louis, Mo.  
 •Brillion Furnace Co., Brillion, Wis.  
 Bristol Co., Waterbury, Conn.  
 Brooklyn Metal Ceiling Co., 233-39 Greene Ave., Brooklyn, N. Y.  
 Bros Boiler & Mfg. Co., Wm., Nicollet Island, Minneapolis, Minn.  
 Brown-Brockmeyer Co., Inc., 1098 Smithville Rd., Dayton, O.  
 Brown Corp., 213 Bellevue Ave., Syracuse, N. Y.  
 Brown Instrument Co., Div. Minneapolis-Honeywell Regulator Co., Wayne & Roberts Aves., Philadelphia, Pa.  
 Brown Oil Burning Equipment Co., 312-314 Massachusetts Ave., Cambridge, Mass.  
 Brownell Co., N. Findlay St., Dayton, O.  
 Brumme Mfg. Co., 314 S. Artesian Ave., Chicago, Ill.  
 •Brundage Co., 246 W. Kalamazoo Ave., Kalamazoo, Mich.  
 Brunner Mfg. Co., 1821 Broad St., Utica, N. Y.  
 Bryan Steam Corp., P. O. Box 337, Peru, Ind.  
 Bryant Corp., C. L., 4610 St. Clair Ave., Cleveland, O.  
 Bryant Heater Co., 17825 St. Clair Ave., Cleveland, O.  
 Bubar, Hudson H., 15 Park Row, New York City  
 Buckeye Products Co., 7024 Vine St., Cincinnati, O.  
 Budke Stamping Co., P. O. Box 96, Canonsburg, Pa.  
 •Buffalo Forge Co., 497 Broadway, Buffalo, N. Y.  
 Buffalo Pumps, Inc., 171 Mortimer St., Buffalo, N. Y.  
 Builders Iron Foundry, 11 Coddling St., Providence, R. I.  
 Burdett Mfg. Co., 19 N. Sheldon St., Chicago, Ill.  
 Burgess Battery Co., 111 W. Monroe St., Chicago, Ill.  
 Burgess Soldering Furnace Co., 292 E. Long St., Columbus, O.  
 Burke Electric Co., 1201 W. 12th St., Erie, Pa.  
 Burmester Gas Furnace Mfg. Co., 2117 Cumming St., Omaha, Nebr.  
 Burnham Boiler Corp., 1 Main St., Irvington, N. Y.  
 Burnham Stoker Co., 505 Columbia St., Vancouver, Wash.  
 •Burnley Battery & Mfg. Co., Clay St., North East, Pa.  
 Burnwell Corp., 126 N. Church St., Allentown, Pa.  
 Burt Air Filter Corp., Grand Central Terminal, New York City.  
 Burt Mfg. Co., 44 E. South St., Akron, O.  
 Bush Mfg. Co., 100 Wellington St., Hartford, Conn.  
 •Butler Mfg. Co., 13th & Eastern, Kansas City, Mo.  
 Butler Street Foundry & Iron Co., 3422 Normal Ave., Chicago, Ill.  
 Butterworth, Jr., B. T., Oak Street, New Canaan, Conn.  
 Byers Co., A. M., Clark Bldg., Pittsburgh, Pa.

## C

- Cabot, Inc., Samuel, 141 Milk St., Boston, Mass.  
 Calbar Paint & Varnish Co., 2620 N. Martha St., Philadelphia, Pa.  
 Caldwell, Farley M., 6th & Harrison Sts., Fort Wayne, Ind.  
 California Cornice, Steel and Supply Corp., 1620 N. Spring St., Los Angeles, Cal.



- California Wire Cloth Co., 1001 22nd Ave., Oakland, Cal.  
 Calkins & Pearce, 203-205 E. Long St., Columbus, O.  
 Callahan Can Machine Co., Inc., 80 Richard St., Brooklyn, N. Y.  
 Callite Product Co., 540 39th St., Union City, N. J.  
 Caloroll Burner Corp., 1477 Park St., Hartford, Conn.  
 • Campbell, Andrew C., Division of American Chain & Cable Co., Inc., Bridgeport, Conn.  
 Campbell Heating Co., 31st and Dean, Des Moines, Ia.  
 Campbell Heating Co., E. K., 2445 Charlotte St., Kansas City, Mo.  
 Canton Steel Ceiling Mfg. Co., 2280 Winfield Way, S. E., Canton, O.  
 Canton Stoker Corp., 507 Andrews Pl., S. W., Canton, O.  
 • Capitol Furnace & Stove Repair, 229 S. Meridian St., Indianapolis, Ind.  
 Carbondale Division, Worthington Pump & Machinery Corp., Harrison, N. J.  
 Carbo-Oxygen Co., 221-223 Fourth Ave., Pittsburgh, Pa.  
 Carey Co., Philip, Wayne Ave., Cincinnati, O.  
 • Carnegie-Illinois Steel Co., Carnegie Bldg., Pittsburgh, Pa.  
 Carnes, Inc., John R., Greenlawn Ave. & Erie R. R., Lima, O.  
 Carraway-Byrd Corp., 618 N. Pearl St., Dallas, Tex.  
 Carrier Corp., 302 S. Geddes St., Syracuse, N. Y.  
 Carter Paint Co., 310 N. Main St., Liberty, Ind.  
 Cary Mfg. Co., Waupaca, Wis.  
 Celotex Corp., 919 N. Michigan Ave., Chicago, Ill.  
 • Central Furnace & Stove Repair Co., 3937 Olive St., St. Louis, Mo.  
 Central Steel & Wire Co., 4545 S. Western Blvd., Chicago, Ill.  
 Central Wire & Iron Works, 621 E. Locust St., Des Moines, Ia.  
 • Century Electric Co., 1806 Pine St., St. Louis, Mo.  
 • Century Engineering Corp., Cor. Fourth Ave. & Third St., Cedar Rapids, Ia.  
 Century Fan & Ventilator Corp., 500 E. 134th St., New York City.  
 Certain-teed Products Corp., 100 E. 42nd St., New York City.  
 Chace Co., W. M., 1606 Beard Ave., Detroit, Mich.  
 Chain Products Co., 3910 Cooper Ave., Cleveland, O.  
 Chalmers Oil Burner Co., 1234 Central Ave., Minneapolis, Minn.  
 Chamberlin Metal Weather Strip Co., 1254 La Brosse, Detroit, Mich.  
 Champion Blower & Forge Co., Harrisburg Ave. & Charlotte St., Lancaster, Pa.  
 Champion Furnace Pipe Co., 918 S. Adams St., Peoria, Ill.  
 Champion Tool Co., 356 W. 91st St., Los Angeles, Cal.  
 • Chandler Co., 804 1st Ave., N. W., Cedar Rapids, Ia.  
 Chapman Clay Co., Zanesville, O.  
 Chapman Slate Co., 546 Main St., Bethlehem, Pa.  
 Char-Gale Mfg. Co., 2945 Harriet Ave., S., Minneapolis, Minn.  
 Chase Brass & Copper Co., Inc., 236 Grand St., Waterbury, Conn.  
 Cheney Co., 1200 Architects Bldg., 17th & Sansom Sts., Philadelphia, Pa.  
 Chicago Automatic Stoker Co., Not Inc., 14 N. Clinton St., Chicago, Ill.  
 Chicago Die Casting Co., 2512 W. Monroe St., Chicago, Ill.  
 Chicago Fire Brick Co., 1467 N. Elston Ave., Chicago, Ill.  
 Chicago Furnace Supply Co., 1278 Clybourn Ave., Chicago, Ill.  
 Chicago Metal Mfg. Co., 3720 S. Rockwell St., Chicago, Ill.  
 Chicago Perforating Co., 2445 W. 24th Pl., Chicago, Ill.  
 Chicago Pump Co., 2336 Wolfram St., Chicago, Ill.  
 Chicago Rawhide Mfg. Co., 1312 Elston Ave., Chicago, Ill.  
 Chicago Rivet & Mach. Co., 1830 S. 54th Ave., Cicero P. O., Chicago, Ill.  
 Chicago Steel & Wire Co., 103rd St. & Torrence Ave., Chicago, Ill.  
 Chicago Steel Furnace Co., 7934 S. Chicago Ave., Chicago, Ill.  
 Chicago Technical College, 118 E. 26th St., Chicago, Ill.  
 Chicago Venetian Blind Co., 1210 S. Morgan St., Chicago, Ill.  
 Chinook, Inc., 111 Endicott-Arcade Bldg., St. Paul, Minn.  
 Christensen Machine Co., 1975 S. Second West St., Salt Lake City, Utah.  
 Christie Cleaner Co., Div. of Cincinnati Sheet Metal & Roofing Co., 226-30 E. Front St., Cincinnati, O.  
 Cincinnati Mfg. Co., Gest & Evans Sts., Cincinnati, O.  
 Cincinnati Shaper Co., Hopple, Garrard & Elam, Cincinnati, O.  
 Cincinnati Sheet Metal & Roofing Co., 230 E. Front St., Cincinnati, O.  
 Cincinnati Stamping Co., 28-34 W. McMicken, Cincinnati, O.  
 • Clarage Fan Co., North & Porter Sts., Kalamazoo, Mich.  
 Clark Bros. Bolt Co., Milldale, Conn.  
 Clark Controller Co., 1146 E. 152nd St., Cleveland, O.  
 Clark, Jr., Electric Co., Jas., 600 Bergman St., Louisville, Ky.  
 Clark Stek-O Corp., 1631 Dewey Ave., Rochester, N. Y.  
 Clarm Mechanical Devices Co., 410 S. Elizabeth St., Lima, O.  
 Clauss Shear Co., Fremont, O.  
 Clay Equipment Corp., Cedar Falls, Ia.  
 Clayton & Lambert Mfg. Co., 11111 French Rd., Detroit, Mich.  
 Cleveland Brush Factory, Inc., 7115 Dearborn Ave., S. W., Cleveland, O.  
 Cleveland Cooperative Stove Co., 2323 E. 67th St., Cleveland, O.  
 Cleveland Fire Brick Co., 1740 E. 12th St., Cleveland, O.  
 Cleveland Punch & Shear Works Co., E. 40th & St. Clair Ave., Cleveland, O.  
 Cleveland Steel Products Corp., 7306 Madison Ave., Cleveland, O.  
 Clifford Mfg. Co., 564 E. First St., Boston, Mass.  
 Climax Machinery Co., 143 E. Morris St., Indianapolis, Ind.  
 Clinton Metallic Paint Co., P. O. Box 278, Clinton, N. Y.  
 Clough, A. W., 28 S. Broad St., Meriden, Conn.  
 Coal Carburetor Co., Woodbridge Ave. & Thomas St., New Brunswick, N. J.  
 Cocking, Geo. J., 1336 W. 5th St., Santa Ana, Cal.  
 Cole Draft Governor Sales Co., 533 N. La Salle St., Chicago, Ill.  
 Cole Hot Blast Mfg. Co., 3108 W. 51st St., Chicago, Ill.  
 Cole-Sullivan Engineering Company, 1316 Third St., North, Minneapolis, Minn.  
 Coleman Lamp & Stove Co., 2nd & St. Francis, Wichita, Kan.  
 Colonial Stove Co., Specialties Division, 2154 E. Somerset St., Philadelphia, Pa.  
 Columbia Burner Co., 729 Ewing St., Toledo, O.  
 Columbia Mills, Inc., Saginaw, Mich.  
 Columbia Steel Co. (Sub. United States Steel Corp.), Russ Bldg., 235 Montgomery St., San Francisco, Cal.  
 Columbian Enameling & Stamping Co., 1536 Beech St., Terre Haute, Ind.  
 • Columbus Heating & Ventilating Co., 182 N. Yale Ave., Columbus, O.  
 Columbus Metal Products, Inc., 767 N. 4th St., Columbus, O.  
 Combustion Engineering Co., Inc., 200 Madison Ave., New York City.  
 Commonwealth Mfg. Corp., 4208 Davis Lane, Cincinnati, O.  
 • Condensation Engineering Corp., 335 S. Western Ave., Chicago, Ill.  
 Conco-Sampsel Stoker Corp., Mendota, Ill.  
 • Congress Tool & Die Co., 9034 Lumkin Ave., Detroit, Mich.  
 Connors Paint Mfg. Co., Wm., 669-683 River St., Troy, N. Y.  
 Consolidated Air Conditioning Corp., 114 E. 32nd St., New York City.  
 Continental Machine Specialties, Inc., 1301 Washington Ave., South, Minneapolis, Minn.  
 Consolidated Metals Corp., 5531 Woodward Ave., Detroit, Mich.  
 Continental Electric Co., Inc., 323 Ferry St., Newark, N. J.  
 Continental Products Co., 1150 E. 222nd St., Euclid, O.  
 Continental Rubber Works, 1900 Liberty Parkway, Erie, Pa.  
 Continental Screw Co., Mt. Pleasant, New Bedford, Mass.  
 Continental Steel Corp., 1108 S. Main St., Kokomo, Ind.  
 Continental Stove Corp., Front & Walnut, Ironton, O.  
 • Cook Electric Co., 2700 Southport Ave., Chicago, Ill.  
 Cooper & Cooper, Inc., 37 Fenn St., Pittsfield, Mass.  
 Cooper Oven Thermometer Co., Pequabuck, Conn.  
 Copeland Refrigeration Corp., Sidney, Ohio.  
 Copperweld Steel Co., Glassport, Pa.  
 Coppus Engineering Corp., 344 Park Ave., Worcester, Mass.  
 Corbin Screw Corp., 300 High St., New Britain, Conn.  
 Corbman Bros., Inc., 1205 N. Fourth St., Philadelphia, Pa.  
 Cork Import Corp., 330 W. 42nd St., New York City.  
 Cork Insulation Co., Inc., 155 E. 44th St., New York City.  
 Cornell Iron Works, Inc., 36-20 13th St., Long Island City, N. Y.  
 Cornell Wood Products Co., 230 N. Michigan Ave., Chicago, Ill.  
 Corozone Air Conditioning Corp., 1422 Euclid Ave., 1110 Hanna Bldg., Cleveland, O.  
 Crane Co., 836 S. Michigan Ave., Chicago, Ill.  
 Cray Mfg. Co., 396 N. Second St., Middleport, O.  
 Crescent Tool Co., 230 Harrison St., Jamestown, N. Y.  
 • Crise Electric Mfg. Co., 316-320 S. Main St., Mt. Vernon, O.  
 Crocker-Wheeler Electric Mfg. Co., Ampere, N. J.  
 Cross Engineering Co., 160-178 Dundaff St., Carbondale, Pa.  
 Crown Fuel Saver Co., Richmond, Ind.  
 Crucible Steel Co. of America, 405 Lexington Ave., New York City.  
 Crystal Refrigerator Co., Fremont, Nebr.  
 Curtis Refrigerating Machine Co., 1905 Kienlen Ave., St. Louis, Mo.  
 Cutler-Hammer, Inc., N. 12th St. and W. St. Paul Ave., Milwaukee, Wis.

## D

- Dall Steel Products Co., 1050 Main St., Lansing, Mich.  
 Daniels Mfg. Co., Inc., Sam, Daniels Rd., Hardwick, Vt.  
 Danville Stove & Mfg. Co., Beaver St., Danville, Pa.  
 Danzer Metal Works Co., 101 W. Lee St., Hagerstown, Md.  
 Davenport Mfg. Co., 301 W. College St., Meadville, Pa.  
 Davies Air Filter Corp., 390 4th Ave., New York City.  
 Day Co., The, 2938 Pillsbury Ave., Minneapolis, Minn.  
 Dayton Greenhouse Mfg. Co., P. O. Box 801, Dayton, O.  
 Dayton Pump & Mfg. Co., Dayton, O.  
 Dayton Rogers Mfg. Co., 2830 13th Ave., So., Minneapolis, Minn.  
 Dayton Rubber Mfg. Co., 2345 W. Riverview Ave., Dayton, O.  
 Debevoise Co., 968 Grand St., Brooklyn, N. Y.  
 De Bothezat Ventilating Equipment Division, American Machine and Metals, Inc., 100 Sixth Ave., New York City.  
 Decatur Iron & Steel Co., Decatur, Ala.  
 Decatur Pump Co., 2750 Nelson Park Rd., Decatur, Ill.  
 De Laval Steam Turbine Co., 300 Nottingham Way, Trenton, N. J.  
 De La Vergne Engine Co. (Sales Agent for Baldwin-Southwark Corp.), Paschall P. O., Philadelphia, Pa.  
 D'Elia Oil Burner Co., Inc., 145 Stratford Ave., Bridgeport, Conn.



Delco-Frigidaire Conditioning Div., General Motors Sales Corporation, 1420 Wisconsin Blvd., Dayton, O.  
 Delco Products Division, General Motors Corp., 329 E. First St., Dayton, O.  
 Delta Stoker Co., Foot of Commonwealth, North Chicago, Ill.  
 Deming Co., 148 Aetna St., Salem, O.  
 Deniston Co., 4856 S. Western Ave., Chicago, Ill.  
 Densmore-Quinlan Co., 910 74th St., Kenosha, Wis.  
 Deshler Foundry & Machine Works, 140-142 S. East Ave., Deshler, O.  
 Des Moines Steel Furnace Co., 509 University Ave., Des Moines, Ia.  
 Des Moines Stove Repair Co., 107 S. W. Second St., Des Moines, Ia.  
 Detroit Air Meter Co., Box 1473, Detroit, Mich.  
 Detroit Lubricator Co., 5900 Trumbull Ave., Detroit, Mich.  
 Detroit Michigan Stove Co., 6900 E. Jefferson Ave., Detroit, Mich.  
 Detroit Safety Furnace Pipe Co., 5960 Second Blvd., Detroit, Mich.  
 Detroit Steel Products Co., 2350 E. Grand Blvd., Detroit, Mich.  
 Detroit Stoker Co., General Motors Bldg., Detroit, Mich. (Sales & Engineering); Monroe, Mich. (Main Office & Works).  
 Detroit Torch & Mfg. Co., 12057 Cardoni Ave., Detroit, Mich.  
 De Vilbiss Co., 300 Phillips Ave., Toledo, O.  
 Devlin Mfg. Co., Thos., Burlington, N. J.  
 Diamond Castings Co., Terra Cotta Rd., Johnsonburg, Pa.  
 Diamond Mfg. Co., 243 W. 8th St., Wyoming, Pa.  
 Diamond Metal Weather Strip Co., 650 N. 4th St., Columbus, O.  
 Dick Co., Inc., R. & J., Passaic, N. J.  
 Dickson & Eddy, 17 Battery Pl., New York City.  
 Dickson Weatherproof Nail Co., P. O. Box 334, Evans-ton, Ill.  
 Dieckmann Co., Ferdinand, 1182 Harrison St., Cincinnati, O.  
 Diehl Mfg. Co., Trumbull St., Elizabeth, N. J.  
 Diener Mfg. Co., Geo. W., 400 N. Monticello Ave., Chicago, Ill.  
 Dodge Mfg. Corp., 500 S. Union St., Mishawaka, Ind.  
 Donley Brothers Co., 13900 Miles Ave., Cleveland, O.  
 Domestic Stoker Co., 7 Dey St., New York City.  
 Dowagiac Steel Furnace Co., Beeson St., Dowagiac, Mich.  
 Downs-Smith Brass & Copper Co., 304-320 E. 45th St., New York City.  
 Dracco Corp., 4057 E. 116th St., Cleveland, O.  
 Dreis & Krump Mfg. Co., 7404 Loomis Blvd., Chicago, Ill.  
 Drouve Co., G., 2082 Kings Highway, Fairfield, Conn.  
 Dunham Co., C. A., 450 E. Ohio St., Chicago, Ill.  
 Dunn, Inc., Struthers, 139 N. Juniper St., Philadelphia, Pa.  
 du Pont de Nemours & Co., E. I., R. & H. Chemicals Dept., Wilmington, Del.  
 Durlon Co., Inc., 411 N. Findlay St., Dayton, O.  
 Duro Co., 537 E. Monument Ave., Dayton, O.  
 Duro Metal Products Co., 2649 N. Kildare Ave., Chicago, Ill.  
 Dutcher Heating Co., 1292 Washington St., Canton, Mass.

## E

Eagle-Picher Lead Co., Temple Bar Bldg., Cincinnati, O.  
 Eaglesfield Ventilator Co., 920 Dorman St., Indianapolis, Ind.  
 Easternoil, Inc., 133 Marginal Way, Portland, Me.  
 Eckenroth Register Co., 445 Sutter St. (Pac. G. & E. Bldg.), San Francisco, Cal.  
 Eclipse Metal Mfg. Co., Main St., Eden, N. Y.  
 Econocel Stoker Division of Cotta Transmission Corp., 2340 11th St., Rockford, Ill.  
 Economy Baler Co., 1020 N. Main St., Ann Arbor, Mich.  
 Economy Electric Co., 4634 W. 21st Pl., Cicero, Ill.  
 Economy Pumping Machinery Co., Inc., 3431 W. 48th Pl., Chicago, Ill.  
 Eddy Stoker Corp., 4717 W. North Ave., Chicago, Ill.  
 Edison Electrical Controls Division, Thos. A. Edison, Inc., Lakeside Ave., West Orange, N. J.  
 Edwards Furnace Co., 25 East Ave., Wellsboro, Pa.  
 Edwards Mfg. Co., Inc., 337 Eggleston Ave., Cincinnati, O.  
 Ehret Magnesia Mfg. Co., Valley Forge, Pa.  
 Elermann Floor Scraper Co., 1971 Fulton St., Brooklyn, N. Y.  
 Eiker Mfg. Company, Ogallala, Nebr.  
 Eisler Engineering Co., 760 S. 13th St., Newark, N. J.  
 Electric Arc Cutting & Welding Co., 152 Jelliff Ave., Newark, N. J.  
 Electric Controller & Mfg. Co., 2700 E. 79th St., Cleveland, O.  
 Electric Materials Co., Clay & Washington Sts., North East, Pa.  
 Electric Soldering Iron Co., Inc., 342 W. 14th St., New York City.  
 Electric Sprayit Co., 224 N. Broadway, Milwaukee, Wis.  
 Electric Vacuum Cleaner Co., Inc., 1734 Ivanhoe Rd., Cleveland, O.  
 Electric Valve Mfg. Co., Inc., 68 Murray St., New York City.  
 Electromatic Corp., 2100 S. Indiana, Chicago, Ill.  
 Electroaire Corp., 1455 W. Congress St., Chicago, Ill.  
 Electrogas Furnace & Mfg. Co., 2575 Bayshore Blvd., San Francisco, Cal.  
 Electrol, Inc., 934 Main Ave., Clifton, N. J.  
 Elec-Tro-Matic Oil Burner Co., 487 Central Ave., Cedarhurst, L. I., N. Y.  
 Electrovent Corp., 5402 Western Ave., Detroit, Mich.  
 Electrovent Fan & Mfg. Co., 812 W. Lake St., Chicago, Ill.

Elgo Shutter & Mfg. Co., 634 W. Warren Ave., Detroit, Mich.  
 Ellison Draft Gage Co., 214 W. Kinzie St., Chicago, Ill.  
 Elsey Metal Specialties Co., 1535 Spruce St., Detroit, Mich.  
 Emerson Electric Mfg. Co., 1843 Washington Ave., St. Louis, Mo.  
 Empire Door Co., Inc., 226 E. 144th St., New York City.  
 Empire Metal Co., 820 E. Water St., Syracuse, N. Y.  
 Empire Sheet & Tin Plate Co., N. Bowman St., Mansfield, O.  
 Emrich Co., C., 312 Broad St., Columbus, O.  
 Enterprise Boiler & Tank Works, Inc., 1955 N. Long Ave., Chicago, Ill.  
 Enterprise Foundry Co., E. "B" St., Belleville, Ill.  
 Enterprise Oil Burner Co., 2949 18th St., San Francisco, Cal.  
 Erdle Perforating Co., 171 York St., Rochester, N. Y.  
 Estate Stove Co., Hamilton, O.  
 Evans Corp., George, 121 37th St., Moline, Ill.  
 Everhot Mfg. Co., 57 S. 19th Ave., Maywood, Ill.  
 Evry-Use Products, Inc., 260 Canal St., New York City.  
 Excellio Oil Heating Corp., 111 1/2 S. 24th St., Omaha, Nebr.  
 Excelsior Steel Furnace Co., 118 S. Clinton St., Chicago, Ill.  
 Excelsior Stove & Mfg. Co., 504-630 S. Front St., Quincy, Ill.  
 Excelsior Tool and Machine Co., 31st & Ridge Ave., East St. Louis, Ill.  
 Excelsio Products Corp., 65 Clyde Ave., Buffalo, N. Y.

## F

Fabling Co., W. D., 722 N. Broadway, Los Angeles, Cal.  
 Fafnir Bearing Co., 37 Booth St., New Britain, Conn.  
 Fairbanks, Morse & Co., 900 S. Wabash Ave., Chicago, Ill.  
 Fairfield Oil Heating Co., Inc., Mason St., Greenwich, Conn.  
 Fairmont Aluminum Co., Fairmont, W. Va.  
 Falstrom Co., Main Ave. & D. L. & W. R. R., Passaic, N. J.  
 Fargo Foundry Co., 92 N. P. Ave., Fargo, N. D.  
 Farquhar Furnace Co., 150 Owens Ave., Wilmington, O.  
 Farris Furnace Co., 920-930 Enos Ave., Springfield, Ill.  
 Faultless Castings Co., 222 Lora Ave., Youngstown, O.  
 Faultless Heater Corp., 10402 St. Clair Ave., Cleveland, O.  
 Favorite Mfg. Co., Young & Weber Sts., Piqua, O.  
 Fedders Mfg. Co., 57 Tonawanda St., Buffalo, N. Y.  
 Federal Machine & Welder Co., 2120 Dana St., Warren, O.  
 Fee and Stemwedel, Inc., 4949 N. Pulaski Rd., Chicago, Ill.  
 Felt Products Mfg. Co., 1523 Carroll Ave., Chicago, Ill.  
 Felters Co., Inc., 210 S. State St., Boston, Mass.  
 Field Mfg. Co., 2328 Nelson St., Chicago, Ill.  
 Figge Co., 189 W. Madison St., Chicago, Ill.  
 Fingles, Inc., W. A., Reisterstown Road at Elgin Ave., Baltimore, Md.  
 Finnell Rotary Stokers, Inc., 502 East St., Elkhart, Ind.  
 Fireline Stove & Furnace Lining Co., 1800 Kingsbury St., Chicago, Ill.  
 Firestone Tire & Rubber Co., 1400 S. Main St., Akron, O.  
 Fisher Governor Co., 102-07 S. First St., Marshalltown, Ia.  
 Fitzgibbons Boiler Co., Inc., 101 Park Ave., New York City.  
 Flemm Lead Co., Inc., Bradley Ave., Long Island City, N. Y.  
 Flintkote Co., 50 W. 50th St., New York City.  
 Floral City Co., 402 S. Monroe St., Monroe, Mich.  
 Floyd-Wells Co., Royersford, Pa.  
 Flynn & Emrich Co., 301 Holliday St., Baltimore, Md.  
 Follansbee Brothers Co., 3rd & Liberty Aves., Pittsburgh, Pa.  
 Folsom Snow Guard Co., 80 Boylston St., Boston, Mass.  
 Foote Foundry Co., J. B., N. Main St., Fredericktown, O.  
 Forest-Air Co., 840 Cedar St., Rockford, Ill.  
 Forest City Foundries Co., 2500 W. 27th St., Cleveland, O.  
 Foss Heating & Engineering Co., 12 S. Chester Ave., Pasadena, Cal.  
 Fowler Pem Co., 5317 Horton St., Emeryville, Cal.  
 Fox Engineering Co., 26 Portland St., Boston, Mass.  
 Fox Furnace Co., Elyria, O.  
 Foxboro Co., Neponset Ave., Foxboro, Mass.  
 Franklin Gas Appliance Co., 221-223 E. Eighth St., Cincinnati, O.  
 Fraser Furnace Co., Inc., 445 S. San Joaquin St., Stockton, Cal.  
 Frederick Iron & Steel Co., E. 7th & East Sts., Frederick, Md.  
 Freshend-Aire Co., 430 W. Erie St., Chicago, Ill.  
 Frick Co., Inc., Waynesboro, Pa.  
 Friedley-Voshardt Co., 761 Mather St., Chicago, Ill.  
 Friez & Sons, Inc., Julien P., 4 N. Central Ave., Baltimore, Md.  
 Fuel Savers, Inc., 15th & Herr Sts., Harrisburg, Pa.  
 Fuller-Warren Co., 2506 N. 32nd St., Milwaukee, Wis.  
 Fulton-Sylphon Co., Knoxville, Tenn.  
 Furblo Co., 100 Main St., Hermansville, Mich.  
 Furnaceslave, Inc., 1080 E. 52nd St., Indianapolis, Ind.

## G

G & O Mfg. Co., 138 Winchester Ave., New Haven, Conn.  
 G. & S. Tool Co., 8790 Grinnell, Detroit, Mich.  
 G. D. S. Machinery & Supply Co., 101 Walker St., New York City.  
 Galva Heater Co., Galva, Ill.  
 Gammeter Co., W. F., Lincoln Ave., Extension, Cadiz, O.  
 Garber Lumber & Construction Co., Strasburg, O.  
 Garden City Fan Co., 332 S. Michigan Blvd., Chicago, Ill.  
 Gardiner Metal Co., 2504 W. 48th Pl., Chicago, Ill.

Gas City Glass Co., Gas City, Ind.  
 Gasoroll Furnace Co., 30 N. LaSalle St., Chicago, Ill.  
 Gasweld & Airway, Inc., 625 W. Jackson Blvd., Chicago, Ill.  
 Gates Rubber Co., 999 S. Broadway, Denver, Colo.  
 Gehl Bros. Mfg. Co., West Bend, Wis.  
 Gehl Co., 1117 Tacoma Ave., Tacoma, Wash.  
 Gem City Stove Co., 508 Linden Ave., Dayton, O.  
 General Air Conditioning Corp., 4411 Appleton St., Cincinnati, O.  
 General Blower Co., 2402 Market St., Philadelphia, Pa.  
 General Controls Co., 1370 Harrison St., San Francisco, Cal.; Broadway & E. 15th St., Cleveland, O.  
 • General Electric Co., 1 River Rd., Schenectady, N. Y.  
 General Equipment Co., 311-15-19 S. Wichita St., Wichita, Kan.  
 General Insulating Products Co., 8821 Fifteenth St., Brooklyn, N. Y.  
 General Insulating & Mfg. Co., 125 Fairview Ave., Alexandria, Ind.  
 General Metal Products Co., 3833 Delor St., St. Louis, Mo.  
 General Machine Co., Inc., 816-826 E. 140th St., New York City.  
 General Oil Heating Corp., 528 Jefferson St., West New York, N. J.  
 General Refrigeration Corporation, Shirland Ave., Beloit, Wis.  
 General Regulator Corp., 2608 Arthington St., Chicago, Ill.  
 General Sheet Metal Works, Inc., 120 Stillman Ave., Bridgeport, Conn.  
 Gerard Chemical Co., 87 Front St., Elizabeth, N. J.  
 Gerhardt, W. F., 2007 W. Broad St., Richmond, Va.  
 Germer Stove Co., Erie, Pa.  
 Gerstein & Cooper, South Boston, Mass.  
 Geuder, Paeschke & Frey Co., W. St. Paul Ave. and N. 15th St., Milwaukee, Wis.  
 Giant Grip Mfg. Co., 31 Osceola St., Oshkosh, Wis.  
 Giant Mfg. Co., South Ave., Council Bluffs, Ia.  
 Gilbert & Barker Mfg. Co., Springfield, Mass.  
 Gilliam Mfg. Co., 650 E. Troy St., Ferndale, Mich.  
 Gilmer Co., L. H., Cottman & Keystone Sts., Tacony, Philadelphia, Pa.  
 Glascock Bros. Mfg. Co., Muncie, Ind.  
 • Gleason-Avery, Inc., 27 Clark St., Auburn, N. Y.  
 Glidden Co., 11001 Madison Ave., Cleveland, O.  
 Globe Iron Roofing & Corrugating Co., P. O. Box 734, Cincinnati, O.  
 Globe Machine & Stamping Co., 1250 W. 76th St., Cleveland, O.  
 Globe Machinery & Supply Co., 205-211 W. Court Ave., Des Moines, Ia.  
 Globe Ventilator Co., 205 River St., Troy, N. Y.  
 G. M. Mfg. Co., Box 151, Madison Square Station, New York City.  
 • Goese Mfg. Co., 2548 N. 18th St., Milwaukee, Wis.  
 Goethel Co., Alfred C., 2337 N. 31st St., Milwaukee, Wis.  
 Goethel Sheet Metal Works, Alfred, 1912 N. Killian Pl., Milwaukee, Wis.  
 Goldens' Foundry & Machine Co., Columbus, Ga.  
 Gold Seal Furnace Co., 234 S. Fourth St., Minneapolis, Minn.  
 Gold Star Oil Burner Mfg. Co., Inc., 146 Warburton Ave., Yonkers, N. Y.  
 Goodrich Co., B. F., 500 S. Main St., Akron, O.  
 Goodyear Tire & Rubber Co., E. Market St., Akron, O.  
 Goulds Pumps, Inc., Fall St., Seneca Falls, N. Y.  
 Graff Furnace Co., Scranton, Pa. (See Faultless Heater Corp., Cleveland, O.)  
 Graham & Co., Inc., John H., 113 Chambers St., New York City.  
 Grand Rapids Blow Pipe and Dust Arrester Co., 525 Monroe Ave., Grand Rapids, Mich.  
 Grand Rapids Die & Tool Co., 113-117 Michigan St., Grand Rapids, Mich.  
 • Grand Rapids Furnace Cleaner Co., 225 Stevens St., S. W., Grand Rapids, Mich.  
 Grand Rapids Wire Products Co., 503 Front Ave., N. W., Grand Rapids, Mich.  
 Granite City Steel Co., 20th & Madison Ave., Granite City, Ill.  
 Graton & Knight Co., 356 Franklin St., Worcester, Mass.  
 Gray Metal Products, Inc., 30 Carlton St., Rochester, N. Y.  
 Green Foundry & Furnace Works, Third & Elm Sts., Des Moines, Ia.  
 Greene Tweed Co., 109 Duane St., New York City.  
 Grinnell Co., Inc., 260 W. Exchange St., Providence, R. I.  
 Grinnell Washing Machine Corp., 723-35 Main St., Grinnell, Ia.  
 • Griswold Mfg. Co., 1001-1065 W. 12th St., Erie, Pa.  
 Grob Brothers, Grafton, Wis.  
 Grobet File Corp. of America, 3 Park Place, New York City.  
 Guardian Electric Mfg. Co., 1621 W. Walnut St., Chicago, Ill.  
 Gulf States Steel Co., Brown-Marx Bldg., Birmingham, Ala.

## H

Hague & Co., Inc., Alfred, 227 34th St., Brooklyn, N. Y.  
 • Hallectric Laboratories, 1793 Lakeview Rd., Cleveland, O.  
 Hall Metal Products Co., 1285 Wilmington Blvd., Long Beach, Cal.  
 • Hall-Neal Furnace Co., 1324 N. Capitol Ave., Indianapolis, Ind.  
 Hamilton Automatic Stoker Corp., 1637 Dixie Highway, Hamilton, O.

Halsted Iron Foundry, Halsted, Pa.  
 Hammett Mfg. Co., 1907 Holmes St., Kansas City, Mo.  
 Hampton Elec. Tool Co., 700 Walnut St., Edgewood, Pittsburgh, Pa.  
 Hampden Cornice Works, 300 Birnie Ave., Springfield, Mass.  
 Handelan Washed Air Co., 305 Fifth St., S., Minneapolis, Minn.  
 Handy & Harmon, 82 Fulton St., New York City.  
 Hansen Mfg. Co., Princeton, Ind.  
 Hardinge Oil Burner Co., 1770 Berteau St. at Ravenswood, Chicago, Ill.  
 Hardy Mfg. Co., 100 Davis Ave., Dayton, O.  
 Hare Stoker Corp., 4853 Rivard St., Detroit, Mich.  
 Harnischfeger Corp., 4400 W. National Ave., Milwaukee, Wis.  
 Harold Furnace Mfg. Co., 3310 Sprague Ave., Spokane, Wash.  
 • Harrington & King Perforating Co., 5649 Fillmore St., Chicago, Ill.  
 Harris Calorific Co., 5501 Cass Ave., N. W., Cleveland, O.  
 Harsch Co., Inc., H., 230 Tuscan Rd., Maplewood, N. J.  
 • Hart & Cooley Mfg. Co., 61 W. Kinzie St., Chicago, Ill.  
 Hart & Crouse Co., Inc., 301 Turner St., Utica, N. Y.  
 Hart Mfg. Co., Bartholomew & Hamilton Sts., Hartford, Conn.  
 Hart Mfg. Co., 2006 N. Western Parkway, Louisville, Ky.  
 Hart Oil Burner Corp., 2200 N. Adams St., Peoria, Ill.  
 Hartzell Propeller Fan Co., 1025 Roosevelt Ave., Piqua, O.  
 Harvey-Whipple, Inc., 55 Emery St., Springfield, Mass.  
 Hassall, Inc., John, Clay & Oakland Sts., Brooklyn, N. Y.  
 Hayes Custer Stove Co., 1202 N. Linden St., Bloomington, Ill.  
 Haynes Furnace Fan Co., 614 Prospect St., Kansas City, Mo.  
 Hays Corp., E. Eighth St., Michigan City, Ind.  
 Hays Mfg. Co., 801 W. 12th St., Erie, Pa.  
 H-B Instrument Co., Inc., 2518 N. Broad St., Philadelphia, Pa.  
 Health-O-Mist Humidifier Mfg. Co., James St., Columbus, Wis.  
 Heartley Machine & Tool Co., 900-8 Summit St., Toledo, O.  
 Heath & Milligan Mfg. Co., Div. of The Glidden Co., 1333 S. Normal Ave., Chicago, Ill.  
 Heating Assurance, Inc., 124 E. Augusta, Spokane, Wash.  
 Heating Equipment Corp., 22 Tudor St., Cambridge, Mass.  
 Heckler Bros., 965 Liberty Ave., Pittsburgh, Pa.  
 Hegeler Zinc Co., P. O. Box 599, Danville, Ill.  
 • Hell Co., 3000 W. Montana St., Milwaukee, Wis.  
 Hendley & Whittemore Co., 6 Blackhawk Blvd., Beloit, Wis.  
 Hendrick Mfg. Co., 37 Dundaff St., Carbondale, Pa.  
 Henry & Wright Mfg. Co., 760 Windsor St., Hartford, Conn.  
 • Henry Furnace & Foundry Co., 3473 E. 49th St., Cleveland, O.  
 Her-Born Eng. & Mfg. Co., Box 666, Sandusky, O.  
 Hercules Chemical Co., Inc., 332 Canal St., New York City.  
 Heritage Stoker Sales, Inc., 105 E. 63rd St., Chicago, Ill.  
 Herrmann & Grace Co., 671 Bergen St., Brooklyn, N. Y.  
 Herron-Zimmers Moulding Co., 3654 Beaufait, Detroit, Mich.  
 • Hess-Snyder Co., Massillon, O.  
 • Hess Warming & Ventilating Co., 1211 S. Western Ave., Chicago, Ill.  
 Hetzel Roofing Products Co., 67 Main St., Newark, N. J.  
 Hexcel Radiator Co., 2500 Flett Ave., Racine, Wis.  
 Higgin Mfg. Co., Newport, Ky.  
 Hill Co., E. Vernon, 179 W. Washington St., Chicago, Ill.  
 Hilo Varnish Co., 42-60 Stewart Ave., Brooklyn, N. Y.  
 Hinde & Dauch Paper Co., Sandusky, O.  
 Hipoint Corp., Water, Elm & Arnold Sts., Bellefontaine, O.  
 Hirschman Co., Inc., W. F., 220 Delaware Ave., Buffalo, N. Y.  
 Hobart Brothers Co., Canal Lock Square, Troy, O.  
 Hoersting & Holtmann Co., 1133 W. 3rd St., Dayton, O.  
 Holcomb & Hoke Mfg. Co., 1545 Van Buren St., Indianapolis, Ind.  
 Holland Furnace Co., Columbia Ave., Holland, Mich.  
 Hollup Corp., 3357 W. 47th Pl., Chicago, Ill.  
 Holtum Mfg. Co., Freeport, Ill.  
 Holtzer-Cabot Electric Co., 125 Amory St., Boston, Mass.  
 "Home Comfort" Furnace & Mfg. Co., 2901-11 Elliot Ave., St. Louis, Mo.  
 Home Furnace Co., 6th St. & P. M. R.R., Holland, Mich.  
 Home Oil Burner Corp., 236 Main St., Hampstead, N. Y.  
 Home Stove Co., 501 Kentucky Ave., Indianapolis, Ind.  
 Hones, Inc., Charles A., 123 S. Grand Ave., Baldwin, N. Y.  
 Hood Co., B. Mifflin, Daisy, Tenn.  
 Horn Co., A. C., 43-36 Tenth St., Long Island City, N. Y.  
 Horton Mfg. Co., 3008 University Ave., S. E., Minneapolis, Minn.  
 Hotentot Co., Inc., 1708 Howard St., Omaha, Nebr.  
 Hotstream Heater Co., 8007 Grand Ave., Cleveland, O.  
 Hough Co., Janesville, Wis.  
 Houghton & Co., E. F., 240 W. Somerset St., Philadelphia, Pa.  
 Howe & Bassett Co., Inc., 840 University Ave., Rochester, N. Y.  
 Howell Electric Motors Co., Howell, Mich.  
 Howell Mfg. Co., 1625 Cleveland Ave., Kansas City, Mo.  
 Howes Co., S. M., 511 Medford St., Charlestown District, Boston, Mass.  
 Hubbard Co., 1014 Marquette Ave., Minneapolis, Minn.  
 • Hub Specialty Co., 84 Governor Winthrop Rd., Somerville, Mass.  
 Hudson Equipment Corp., 324 Third Ave., N., Minneapolis, Minn.  
 Hugo Mfg. Co., 49th Ave. W. & Superior St., West Duluth, Minn.  
 Humidi-Cooler Corp., New Haven, Conn.  
 Hupp Oil Burner Co., Inc., 251 Prospect Ave., Brooklyn, N. Y.  
 • Hussey & Co., C. G., 2850 Second Ave., Pittsburgh, Pa.



- I  
Ideal Commutator Dresser Co., 1084 Park Ave., Sycamore, Ill.  
Ideal Electric & Mfg. Co., E. First & Oak Sts., Mansfield, O.  
Ideal Furnace Co., 2995 E. Grand Blvd., Detroit, Mich.  
Ideal Metal Weather Strip Co., 1015 Walnut, Box 461, Boulder, Colo.  
Ilg Electric Ventilating Co., 2850 N. Crawford Ave., Chicago, Ill.  
Illinois Iron & Bolt Co., 918 S. Michigan Ave., Chicago, Ill.  
● Illinois Testing Laboratories, Inc., 412 N. LaSalle St., Chicago, Ill.  
Illinois Zinc Co., Peru, Ill.  
Imperial Brass Mfg. Co., 1200 W. Harrison St., Chicago, Ill.  
Imperial Electric Co., Ira Ave., Akron, O.  
Independence Stove & Furnace Co., Cor. Hayward & Cottage, Independence, Mo.  
Independent Air Filter Co., Inc., 228 N. LaSalle St., Chicago, Ill.  
Independent Pneumatic Tool Co., 600 W. Jackson Blvd., Chicago, Ill.  
● Independent Register Co., 3741 E. 93rd St., Cleveland, O.  
Indian Trailer Corp., Koolroom Division, 2338 Indiana Ave., Chicago, Ill.  
Industrial Sheet Metal Works, Inc., Detroit, Mich.  
Industrial Engineering Co., Evansville, Ind.  
Ingersoll-Rand, 11 Broadway, New York City.  
Ingersoll Steel & Disc Div. Borg-Warner Corp., 310 S. Michigan Ave., Chicago, Ill.  
Ingle Mfg. Co., Atlantic & Grape Sts., San Diego, Cal.  
Inland Steel Co., 38 S. Dearborn St., Chicago, Ill.  
Insulite Co., 1100 Builders Exchange Bldg., Minneapolis, Minn.  
● International Engineering, Inc., 1145 Bolander, Dayton, O.  
International Heater Co., 101 Park Ave., Utica, N. Y.  
● International Nickel Co., Inc., 67 Wall St., New York City.  
International Steel Co., Edge St., Evansville, Ind.  
● Interstate Machinery Co., Inc., 130 S. Clinton St., Chicago, Ill.  
Iona Ventilator Co., Inc., 2821-29 W. Dauphin St., Philadelphia, Pa.  
Iowa Foundry Co., W. 2nd & Cook, Sioux City, Ia.  
Iowa Paint Mfg. Co., 118-20 Eighth St., Des Moines, Ia.  
Iron Fireman Mfg. Co., 3170 W. 106th St., Cleveland, O.  
Iwan Brothers, 1503 Prairie Ave., South Bend, Ind.

## J

- Jackson-Bangor Slate Co., Pen Argyl, Pa.  
Jackson Sheet Metal Works, 3012 Washington Ave., Ogden, Utah.  
● Jackson & Church Co., 321 N. Hamilton Ave., Saginaw, Mich.  
Jacobs Co., B. & J., 1725 Johns St., Cincinnati, O.  
Jacobsen Mfg. Co., Washington at 8th, Racine, Wis.  
Jacobson Machine Works, Inc., A. E., 1090 Tenth Ave., S. E., Minneapolis, Minn.  
● Jaden Mfg. Co., Inc., F., 1601 2nd St., Hastings, Nebr.  
Jamar Co., Walker, 387 S. First Ave., E., Duluth, Minn.  
James Regulator Co., Inc., Peacock St., Pottsville, Pa.  
Janetta Mfg. Co., 556 W. Monroe St., Chicago, Ill.  
Jefferson Electric Co., 25th & Madison St., Bellwood, Ill.  
Jelliff Mfg. Corp., C. O., Southport, Conn.  
Jessop Steel Co., Washington, Pa.  
Jewett Stove & Foundry Corp., Military Rd., Buffalo, N. Y.  
Johns-Manville, 22 E. 40th St., New York City.  
● Johnson Co., S. T., 940 Arlington St., Oakland, Cal., and 401 N. Broad St., Philadelphia, Pa.  
Johnson Fan & Blower Corp., 1319 W. Lake St., Chicago, Ill.  
● Johnson Gas Appliance Co., 520 "E" Ave., N. W., Cedar Rapids, Ia.  
Johnson, Inc., William, Brenner & Kent Sts., Newark, N. J.  
Johnson Mfg. Co., Tenth & Sycamore, Waterloo, Ia.  
Johnson Mfg. Co., Urbana, O.  
Johnson Metal Products Co., Erie, Pa.  
Johnson Service Co., 507 E. Michigan St., Milwaukee, Wis.  
Johnson Tool Co., Inc., 65 Massasoit Ave., East Providence, R. I.  
Johnston & Chapman Co., 2925 Carroll Ave., Chicago, Ill.  
Johnston & Jennings Co., 877 Addison Rd., Cleveland, O.  
Johnston Co., Wm. W., 115 Bayard St., Dayton, O.  
Johnston Gas Furnace Corp., 5367 W. Washington St., Los Angeles, Cal.  
Johnston Mfg. Co., 2825 E. Hennepin Ave., Minneapolis, Minn.  
Johnston Tin Foil & Metal Co., 6106 S. Broadway, St. Louis, Mo.  
Joliet Heating Corp., 2101 Herkimer St., Joliet, Ill.  
Jones & Laughlin Steel Corp., Third Ave. & Ross St., Pittsburgh, Pa.  
Jones Foundry & Machine Co., W. A., 4401 W. Roosevelt Rd., Chicago, Ill.  
● Jordan & Co., Paul R., 630 S. Delaware St., Indianapolis, Ind.

## K

- Kals Sunrise Works, 5659 Linwood Ave., Detroit, Mich.  
Kaiserair Products Sales Co., 3336 Franklin Blvd., Chicago, Ill.

- Kalamazoo Stove Co., Kalamazoo, Mich.  
Kane Mfg. Corporation, Kane, Pa.  
Kansas City Furnace Co., 624 Prospect, Kansas City, Mo.  
Kauffman Air Conditioning Corp., 4336 W. Pine St., St. Louis, Mo.  
Kaybar Burner Corp., 4545 Cottage Grove Ave., Chicago, Ill.  
Keasbey & Mattison Co., Butler Ave., Ambler, Pa.  
Keith Furnace Co., Dean Ave. at E. 26th, Des Moines, Ia.  
Kellogg Compressor & Mfg. Corp., 97 Humboldt St., Rochester, N. Y.  
Kelsey Heating Co., 277 James St., Syracuse, N. Y.  
Kelvinator Corp., 14250 Plymouth Rd., Detroit, Mich.  
Kent Co., Inc., 103 Canal St., Rome, N. Y.  
Kernchen Co., 103 E. Wacker Dr., Chicago, Ill.  
Kester Solder Co., 4201 Wrightwood Ave., Chicago, Ill.  
Ke-Ti Products Co., 1757 Franklin Ave., Columbus, O.  
Kewanee Boiler Corp., Kewanee, Ill.  
● Kidder Mfg. Co., Inc., J. F., 426 Colchester Ave., Burlington, Vt.  
King Ventilating Co., Box 178, Owatonna, Minn.  
Kinnear Mfg. Co., P. O. Box 1407, Columbus, O.  
Kirk & Blum Mfg. Co., 2850 Spring Grove Ave., Cincinnati, O.  
Kisco Co., Inc., 4414-18 W. Papin St., St. Louis, Mo.  
Kitson Co., Westmoreland & Stokley Sts., Philadelphia, Pa.  
Klauer Mfg. Co., 9th & Washington Sts., Dubuque, Ia.  
Kleenaire Corp., 409 Jefferson St., Stevens Point, Wis.  
Kleen-Heat, Inc., 1823 Carroll Ave., Chicago, Ill.  
Klein Stove Co., Trenton Ave. & Tioga St., Philadelphia, Pa.  
Knowles Mushroom Ventilator Co., 41 N. Moore St., New York City.  
Knox Stove Works, Knoxville, Tenn.  
● Kol-Master Corp., Oregon, Ill.  
Koons Furnace Co., 219 W. Van Buren, Danville, Ill.  
Koppers Co., Tar and Chemical Div., Koppers Bldg., Pittsburgh, Pa.  
Korfund Co., Inc., 48-15 32nd Pl., Long Island City, N. Y.  
Kor-Lok Co., Union Trust Bldg., Cleveland, O.  
Korth Oil Burner Corp., 123 Hawthorne St., Roselle Park, N. J.  
Kraker, Henry, 54 W. 14th St., Holland, Mich.  
Krehbiel, J. H., 425 N. Crawford Ave., Chicago, Ill.  
Kruse Co., Inc., 353 W. 16th Pl., Indianapolis, Ind.  
Kruse & Dewenter Co., 427-429 E. Washington St., Indianapolis, Ind.

## L

- Laclede-Christy Clay Products Co., 411 N. Seventh St., St. Louis, Mo.  
Laclede Steel Co., Arcade Bldg., St. Louis, Mo.  
Laco Oil Burner Co., 338 Union St., Griswold, Ia.  
La Crosse Steel Roofing & Corrugating Co., 300 S. Third St., La Crosse, Wis.  
LaCrosse Tractor Co., Wood & Clinton Sts., LaCrosse, Wis.  
Lamb & Ritchie Co., 250 Albany St., Cambridge, Mass.  
Laminated Metals Corp., Providence, R. I.  
● Lamneck Products, Inc., 414 Dublin Ave., Columbus, O.  
Landwehr Heating Corp., 6th & Cayuga Sts., Philadelphia, Pa.  
● Langenkamp Co., F. H., 229 E. South St., Indianapolis, Ind.  
Lastik Products Co., Inc., 603 American Bank Bldg., Pittsburgh, Pa.  
● Lau Blower Co., 954-72 E. Monument Ave., Dayton, O.  
Leach Co., 413 S. Main St., Oshkosh, Wis.  
Leahy Mfg. Co., 1804 E. 8th St., Los Angeles, Cal.  
Lecourtenay Co., 5 Main St., Newark, N. J.  
Ledkote Products Co., 36-29 23rd St., Long Island City, N. Y.  
Lee & Son Co., K. O., Aberdeen, S. D.  
Lee & Son Co., Thomas, 128-132 W. Second St., Cincinnati, O.  
Lee Heating Systems, 810 Union National Bank Bldg., Youngstown, O.  
Leeds & Northrup Co., 4953 Stenton Ave., Philadelphia, Pa.  
Leeson Co., T. F., 14631 Meyers Rd., Detroit, Mich.  
Lehigh Fan & Blower Co., Front & Linden Sts., Allentown, Pa.  
Leland Electric Co., 1501 Webster St., Dayton, O.  
Lennox Furnace Co., 200 Lincoln Highway, Marshalltown, Ia., and Syracuse, N. Y.  
● Levow, David, 308 W. 20th St., New York City.  
Lewis & Co., Inc., Chas. S., 2207 Pine St., St. Louis, Mo.  
● Libert Machine Co., 324 N. Roosevelt St., Green Bay, Wis.  
Liberty Coal Burner Co., 4363 Duncan St., St. Louis, Mo.  
Liberty Foundry Co., Sidney & Ohio Sts., St. Louis, Mo.  
Lincoln Electric Co., 12818 Coit Rd., Cleveland, O.  
Linde Air Products Co., 30 E. 42nd St., New York City.  
Link-Belt Co., Stoker Div., 2410 W. 18th St., Chicago, Ill.  
Liquefied Gas Appliance Co., Mars, Pa.  
Lissberger & Son, Inc., Marks, 23-01 Borden Ave., Long Island City, N. Y.  
Little Burner Co., Inc., H. C., 2nd & Lincoln, San Rafael, Cal.  
Littleford Bros., 457 E. Pearl St., Cincinnati, O.  
● Lochinvar Corp., 14247 Tireman Ave., Dearborn, Mich.  
Logan-Long Co., 37 W. Van Buren St., Chicago, Ill.  
Lookout Furnace Co., Manufacturer's Rd. & Compress St., Chattanooga, Tenn.  
Lord Mfg. Co., 1316 Holland St., Erie, Pa.  
Lovejoy Flexible Coupling Co., 5001 W. Lake St., Chicago, Ill.  
Ludlow-Saylor Wire Co., Newstead Ave. & Wabash R. R., St. Louis, Mo.



Ludlum Steel Co., Watervliet, N. Y.  
 Ludowici-Celadon Co., 104 S. Michigan Ave., Chicago, Ill.  
 Lukens Metal Co., Thos. F., 1105 Fairmount Ave., Philadelphia, Pa.  
 Lukens Steel Co., 104 S. First Ave., Coatesville, Pa.  
 Lustro Coated Sheets Co., 1220 Ridge Ave., Pittsburgh, Pa.  
 Lyman Co., H. B., Southampton, Mass.  
 Lynn Products Co., 7 Willow St., Lynn, Mass.  
 • Lyon, Conklin & Co., Inc., Race & McComas Sts., Baltimore, Md.

## M

Maas & Waldstein Co., 438 Riverside Ave., Newark, N. J.  
 McClave-Brooks Co., W. Poplar St., Scranton, Pa.  
 McClure Builders' Supply Co., 68 E. Clark St., East Palestine, O.  
 McCord Radiator & Mfg. Co., 2587 E. Grand Blvd., Detroit, Mich.  
 McCorkle Co., D. H., Sixth & Bancroft Way, Berkeley, Cal.  
 McDonnell & Miller, 400 N. Michigan Ave., Chicago, Ill.  
 McGee-Parry Machine Works, 465 W. 8th St., Salt Lake City, Utah.  
 Mack Ventilator Co., 28 Ash St., Saugus, Mass.  
 McPherson Furnace & Supply Co., 1805 N. E. 2nd Ave., Portland, Ore.  
 McQuay, Inc., 1600 Broadway, N. E., Minneapolis, Minn.  
 MaGill Foundry & Furnace Works, P. H., 401-413 E. Oakland Ave., Bloomington, Ill.  
 Mahan Oil Burner & Furnace Co., Lake & Church, Elmhurst, Ill.  
 Mahon Co., R. C., 8650 Mt. Elliott Ave., Detroit, Mich.  
 Mahoning Valley Steel Co., McKees Lane, Niles, O.  
 Mahr Mfg. Co., 1728 N. 2nd St., Minneapolis, Minn.  
 • Mald-O'-Mist, Inc., 180 N. Wacker Dr., Chicago, Ill.  
 Majestic Co., 733 Erie St., Huntington, Ind.  
 Majestic Furnace Co., 1723 Westlake Ave., N., Seattle, Wash.  
 Mall Tool Company, 7740 South Chicago Ave., Chicago, Ill.  
 Malleable Iron Fittings Co., Branford, Conn.  
 Manhattan Perforated Metal Co., Inc., 43-17 37th St., Long Island City, N. Y.  
 Manhattan Rubber Mfg. Division of Raybestos-Manhattan, Inc., 61 Willett St., Passaic, N. J.  
 Manley Products Corp., State & Hay Sts., York, Pa.  
 Manning, Maxwell & Moore, Inc., 11 Ellas St., Bridgeport, Conn.  
 Maple City Furnace Co., 605 S. Main St., Monmouth, Ill.  
 Maple Valley Mfg. Co., First St., Mapleton, Ia.  
 • Maplewood Machinery Co., Inc., 2634 Fullerton Ave., and 561 W. Washington Blvd., Chicago, Ill.  
 Marathon Electric Mfg. Corp., Wausau, Wis.  
 Marion Machine, Foundry & Supply Co., P. O. Box 685, Marion, Ind.  
 • Marley Co., 1915 Walnut St., Kansas City, Mo.  
 Marlo Coll Co., 6135 Manchester Ave., St. Louis, Mo.  
 Marquette Mfg. Co., Inc., 401-409 Johnson St., N. E., Minneapolis, Minn.  
 Marsh Lumber Co., 535-611 Tuscarawas Ave., N. W., Dover, O.  
 Marshall Furnace Co., Marshall, Mich.  
 Marshall Heating Co., 1647 Hennepin Ave., Minneapolis, Minn.  
 • Marshalltown Mfg. Co., 901 E. Nevada St., Marshalltown, Ia.  
 Martin Bros., 52 Mt. Hope Ave., Rochester, N. Y.  
 Martin Metal Mfg. Co., 900 E. 2nd St., Wichita, Kan.  
 Martin-Parry Corp., W. Market St., York, Pa.  
 Martocello & Co., Jos. A., 229 N. 13th St., Philadelphia, Pa.  
 Marvelaire Corp., 1827 Pontius Ave., West Los Angeles, Calif.  
 Masonite Corp., 111 W. Washington St., Chicago, Ill.  
 Master Electric Co., 100 Davis Ave., Dayton, O.  
 Master Welders, 2524 Holmes St., Kansas City, Mo.  
 Matthiessen & Hegeler Zinc Co., Ninth St., LaSalle, Ill.  
 Maurath, Inc., 7809 Union Ave., Cleveland, O.  
 • Maurey Mfg. Corp., Wabash at 29th, Chicago, Ill.  
 May-Fieberger Co., S. 21st St., Newark, O.  
 Mayflower Oil Burner Corp., 5002 Hudson Blvd., West New York, N. J.  
 Mayflower-Lewis Corp., Duluth Ave. & E. Seventh St., St. Paul, Minn.  
 May Oil Burner Corp., Maryland Ave. & Oliver St., Baltimore, Md.  
 Maysteel Products, Inc., Horicon St., Maysville, Wis.  
 Maze Co., W. H., 1207 Water St., Peru, Ill.  
 Mechanical Air, 801 Thomas St., Little Rock, Ark.  
 Medart Co., 3500 DeKalb St., St. Louis, Mo.  
 Meier Electric & Machine Co., 3525 E. Washington St., Indianapolis, Ind.  
 Melbye Bros., Inc., 3204 N. Oakley Ave., Chicago, Ill.  
 Mellish & Murray Co., 1715 Carroll Ave., Chicago, Ill.  
 Merchant & Evans Co., 2035 Washington Ave., Philadelphia, Pa.  
 Mercoid Corp., 4201 Belmont Ave., Chicago, Ill.  
 Merrill Co., Inc., 98 Granite St., Boston, Mass.  
 Mesker & Co., Geo. L., 400 N. W. First St., Evansville, Ind.  
 Metal Door & Trim Co., La Porte, Ind.  
 Metalizing Co., 1351 E. 17th St., Los Angeles, Cal.  
 Metal Products Co., 1811 Linn St., Cincinnati, O.  
 Metalace Corp., 60 K St., South Boston, Mass.  
 Metals Coating Co. of America, 495 N. Third St., Philadelphia, Pa.  
 Metropolitan Refining Co., 23 50th Ave., Long Island City, N. Y.

Metzner Stove Repair Co., 515 Wyandotte, Kansas City, Mo.  
 • Meyer & Bro. Co., F., 1311-13 S. Adams St., Peoria, Ill.  
 • Meyer Furnace Co., 1300 S. Washington St., Peoria, Ill.  
 Meyers Fuel Saver Co., Inc., Janesville, Wis.  
 • Michigan Tank & Furnace Corp., 14101 Prairie Ave., Detroit, Mich.  
 Michigan Wire Cloth Co., 2100 Howard St., Detroit, Mich.  
 Micro Products Co., Peoria, Ill.  
 Micro Switch Corp., 1 E. Spring St., Freeport, Ill.  
 Micro-Westco, Inc., Bettendorf, Ia.  
 Midwest Aluminum Products, Inc., 123 E. Pittsburgh Ave., Milwaukee, Wis.  
 Midwest Ventilating Works, 123 E. Pittsburgh Ave., Milwaukee, Wis.  
 Milburn Co., Alexander, 1424 W. Baltimore St., Baltimore, Md.  
 • Milcor Steel Co., 4117 W. Burnham St., Milwaukee, Wis.  
 Miller & Connell Co., 1454-56 N. Claremont Ave., Chicago, Ill.  
 Miller & Doing, Inc., 60 York St., Brooklyn, N. Y.  
 Miller & Son, C. Arthur, 202-204 S. Main St., Elmira, N. Y.  
 Miller Electric Mfg. Co., 905 N. Meade St., Appleton, Wis.  
 Miller Equipment Co., 120 Opera Pl., Cincinnati, O.  
 Miller Floor Furnace Co., 741 E. 14th St., Oakland, Cal.  
 Miller Range & Furnace Co., Wm., 810-812 Main St., Cincinnati, O.  
 Miller Rubber Co., Inc., 1247 S. High St., Akron, O.  
 Mill-Rose Co., 2493 E. 79th St., Cleveland, O.  
 Mills Novelty Co., 4110 W. Fullerton Ave., Chicago, Ill.  
 Milwaukee Brush Mfg. Co., 2236 N. 30th St., Milwaukee, Wis.  
 Mineral Felt Co., 2284-92 Albion St., Toledo, O.  
 Mineral Insulation Co., 103rd & S. West Highway, Chicago Ridge, Ill.  
 Minneapolis Automatic Draft Regulator Co., 506 Produce Exchange Bldg., Minneapolis, Minn.  
 • Minneapolis-Honeywell Regulator Co., 2726 Fourth Ave., S., Minneapolis, Minn.  
 Minn-Kota Foundry & Mfg. Co., 201 Second St., N., Fargo, N. D.  
 Minster Machine Co., Minster, O.  
 Misener Mfg. Co., Inc., 326 E. Washington St., Syracuse, N. Y.  
 Mitchell Moulding Co., 1501 Circle Ave., Forest Park, Ill.  
 Model Mfg. Co., 316 E. Main St., Richmond, Va.  
 Modern Engineering Co., 3411 Pine Blvd., St. Louis, Mo.  
 Modern Heat Regulator Co., E. 55th St., at Utica Ave., Cleveland, O.  
 Modine Mfg. Co., 17th St., Racine, Wis.  
 Moeller Instrument Co., 132nd St. & 89th Ave., Richmond Hill, N. Y.  
 Mohler Co., J. K., The, 151 Church Ave., Ephrata, Pa.  
 Mohr-Air Co., 422 Huber Bldg., Marion, O.  
 Moloch Foundry & Machine Co., Kaukauna, Wis.  
 Monarch Furnace Fittings Manufacturers, 2240 W. 49th St., Chicago, Ill.  
 Monarch Mfg. Works, Inc., Salmon & Westmoreland Sts., Philadelphia, Pa.  
 Monarch Metal Weatherstrip Corp., 6333 Etzel Ave., St. Louis, Mo.  
 Moncrief Furnace Co., P. O. Box 1673, Atlanta, Ga.  
 Monitor Controller Co., 51 S. Gay St., Baltimore, Md.  
 • Monmouth Products Co., 1929-41 East 61st St., Cleveland, O.  
 Montag Stove & Furnace Works, 2011 N. Columbia Blvd., Portland, Ore.  
 Montgomery Brothers, 61 Fremont St., San Francisco, Cal.  
 Moore Corp., Benton St., Joliet, Ill.  
 Morris Machine Works, 20 E. Genesee St., Baldwinsville, N. Y.  
 Morrissey & Co., 325 W. Huron St., Chicago, Ill.  
 Morse Chain Co., Turner Pl., Ithaca, N. Y.  
 Mortell Co., J. W., 310 S. Michigan Ave., Chicago, Ill.  
 Motorstokor Div., Hershey Machine & Foundry Co., Manheim, Pa.  
 Motor Wheel Corp., Heater Division, E. May St., Lansing, Mich.  
 Mountain States Equipment Co., 1238 Speer St., Denver, Colo.  
 Mt. Vernon Furnace & Mfg. Co., Mt. Vernon, Ill.  
 • Mueller Furnace Co., L. J., 2005 W. Oklahoma Ave., Milwaukee, Wis.  
 Mullins Mfg. Corp., 1021 Mill St., Salem, O.  
 Muncie Gear Works, Inc., N. Vine St., Muncie, Ind.  
 Mundet Cork Corp., 450 7th Ave., New York City.  
 Mundt & Sons, Charles, 53 Fairmount Ave., Jersey City, N. J.  
 Murray Tile Co., Cloverport, Ky.  
 Myers & Bro. Co., The F. E., Ashland, O.  
 Myers Electric Co., 410 Third Ave., Pittsburgh, Pa.

## N

Nash Engineering Co., South Norwalk, Conn.  
 Nash Refrigeration Co., Inc., Summit, New & Blecker Sts., Newark, N. J.  
 National Air Conditioning, Inc., 101 Park Ave., New York City.  
 National Air Conditioning Engineering Corp., Kansas City, Mo.  
 National Airoil Burner Co., 1327 Girard Ave., Philadelphia, Pa.

- National Brass & Copper Co., Inc., 518 Grant Bldg., Pittsburgh, Pa.  
 National Fan & Blower Corp., Subsidiary U. S. Air Conditioning Corp., 2105 Kennedy St., N. E., Minneapolis, Minn.  
 National Fireproofing Corp., Fulton Bldg., Pittsburgh, Pa.  
 National Foundry & Furnace Co., Station "B," Dayton, O.  
 National Gypsum Co., Delaware Ave., Buffalo, N. Y.  
 National Lead Co., 111 Broadway, New York City.  
 National Machine Tool Co., 1536 Clark St., Racine, Wis.  
 National Machine Works, 122 S. Michigan Ave., Chicago, Ill.  
 National Mfg. Corp., 153 Fillmore Ave., Tonawanda, N. Y.  
 National Manufacturing & Engineering Co., 628 E. Forest Ave., Detroit, Mich.  
 National Regulator Co., 2301 N. Knox Ave., Chicago, Ill.  
 National Screw & Mfg. Co., 2440 E. 75th St., Cleveland, O.  
 National Sheet Metal Co., 1617-1629 Water St., Peru, Ill.  
 National Steam Pump Co., 701 W. Johnson St., Upper Sandusky, O.  
 National Super Service Co., 1944 N. 13th St., Toledo, O.  
 Naylor Pipe Co., 1230 E. 92nd St., Chicago, Ill.  
 Neemes Foundry, Inc., 286 First St., Troy, N. Y.  
 Nelson Co., 2604 4th Ave., Detroit, Mich.  
 Nelson Corp., Herman, 1824 Third Ave., Moline, Ill.  
 Nelson Mfg. Co., B. F., Cor. Main & Marshall Sts., N. E., Minneapolis, Minn.  
 Nesbitt, Inc., John J., State Rd. & Rhawn St., Philadelphia, Pa.  
 New Albany Machine Mfg. Co., E. 10th & Water Sts., New Albany, Ind.  
 New Delphos Mfg. Co., 102-124 S. Pierce St., Delphos, O.  
 New Departure Mfg. Co., Bristol, Conn.  
 New Haven Copper Co., Seymour, Conn.  
 New Jersey Zinc Sales Co., 160 Front St., New York City.  
 Newman Brothers, Inc., 662-670 W. Fourth St., Cincinnati, O.  
 Newport Rolling Mill Co., The, 9th & Lowell Sts., Newport, Ky.  
 New York Blower Co., 3155 Shields Ave., Chicago, Ill.  
 Niagara Blower Co., 6 E. 45th St., New York City.  
 • Niagara Machine & Tool Works, 637-697 Northland Ave., Buffalo, N. Y.  
 Niles Rolling Mill Co., Niles, O.  
 Nomis Corp., 410-420 Lingle Ave., Lafayette, Ind.  
 Norge Heating & Conditioning Div., Borg-Warner Corp., 670 E. Woodbridge St., Detroit, Mich.  
 Norma-Hoffman Bearings Corp., Stamford, Conn.  
 Norman Sheet Metal Mfg. Co., W. F., 212-236 N. Cedar St., Nevada, Mo.  
 Norristown Magnesia & Asbestos Co., Washington St., Below Ford St., Norristown, Pa.  
 North Bangor Slate Co., Bangor, Pa.  
 Northern Blower Co., 6409 Barborton Ave., Cleveland, O.  
 Northern Weatherstrip Co., 367 S. 1st Ave. E., Duluth, Minn.  
 • Northwestern Stove Repair Co., 662 W. Roosevelt Rd., Chicago, Ill.  
 Nortmann-Duffke Co., 2740 S. 32nd St., Milwaukee, Wis.  
 Norwin Co., East Alburn St., Freeport, Ill.  
 Novy Ventilator Mfg. Co., 207 E. Broadway, Muskogee, Okla.  
 Nugent Sons, Inc., Thos., 223 E. 80th St., New York City.  
 • Nu-Way Corp., 2416 Fourth Ave., Rock Island, Ill.
- O
- Oakland Foundry Co., Avenue A & L. & N. Tracks, Belleville, Ill.  
 Odin Stove Mfg. Co., Erie, Pa.  
 Ohio Electric Mfg. Co., 5910 Maurice Ave., Cleveland, O.  
 Ohio Pattern Wks. & Fdry. Co., 2735 Colerain Ave., Cincinnati, O.  
 Ohio Products Co., 4158 Rustic Rd., Cleveland, O.  
 Ohio Welder Co., Middlefield, O.  
 Ohio Wire Products Co., Public Square, Dover, O.  
 Ohl & Co., Geo. A., 151-161 Oraton St., Newark, N. J.  
 Ohmlac Paint & Refining Co., 6540 S. Central Ave., Chicago, Ill.  
 Oil Burner Builders, Inc., Bellevue, Ia.  
 Orbon Stove Co., L. & N. and Sycamore St., Belleville, Ill.  
 "Original" Metal Forming Machine Co., 332 17th Ave., Seattle, Wash.  
 Ormsby-Gray Combustion Service, Inc., 6625 Delmar Blvd., St. Louis, Mo.  
 • Osborn Co., J. M. & L. A., 1541 E. 38th St., Cleveland, O.  
 Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland, O.  
 Otis Steel Co., 3341 Jennings Rd., Cleveland, O.  
 OverSpred Stoker Co., Fulton, Jackson & Jefferson Sts., Ottawa, Ill.  
 Owen-Dyneto Corp., Syracuse, N. Y.  
 • Owens-Illinois Glass Co., Ohio Bldg., Toledo, O.
- P
- Pacific Gas Radiator Co., 1740 W. Washington St., Los Angeles, Cal.  
 Pacific Lumber Co., 102 Bush St., San Francisco, Cal.  
 Pacific States Felt & Mfg. Co., Inc., 845 Howard St., San Francisco, Cal.  
 Packham Crimper Co., Mechanicsburg, O.
- Page Steel & Wire Div. of American Chain Co., Inc., Monessen, Pa.  
 Palmer Electric Co., 20 Sproat St., Detroit, Mich.  
 "Pamco" Conditionalire Co., 4223 W. Lake St., Chicago, Ill.  
 Pan American Engineering Corp., Ltd., 820 Parker St., Berkeley, Cal.  
 Paragon Electric Co., 37 W. Van Buren St., Chicago, Ill.  
 Park City Cornice Works, Inc., 56 McKinley Ave., Bridgeport, Conn.  
 • Parker-Kalon Corp., 190 Varick St., New York City.  
 Parkersburg Iron & Steel Co., Parkersburg, W. Va.  
 Parks-Cramer Co., 970 Main St., Fitchburg, Mass.  
 Patent Novelty Co., 312 Eighth St., Fulton, Ill.  
 Patten Co., J. V., 500 DeKalb Ave., Sycamore, Ill.  
 Patterson Foundry & Machine Co., East Liverpool, O.  
 Patterson Shade Co., 1525 N. Meridian St., Indianapolis, Ind.  
 • Payne Furnace & Supply Co., 338 N. Foothill Rd., Beverly Hills, Cal.  
 • Peck, Stow & Wilcox Co., Center St., Southington, Conn.  
 Pecora Paint Co., 4th St. & Erie Ave., Philadelphia, Pa.  
 • Peerless Electric Co., 1401 W. Market St., Warren, O.  
 • Peerless Foundry Co., 1853 Ludlow Ave., Indianapolis, Ind.  
 Peerless of America, Inc., 515 W. 35th St., Chicago, Ill.  
 Peerless Oil Burner Co., Inc., 3926 Main St., Kansas City, Mo.  
 Pels & Co., Inc., Henry, 90 West St., New York City.  
 Pencilsharp Awl & Tool Co., 1423-25 E. Illinois St., Evansville, Ind.  
 • Peninsular Stove Co., 2699 Gratiot Ave., Detroit, Mich.  
 • Penn Electric Switch Co., Box 556, Goshen, Ind.  
 Pennsylvania Engineering Works, 526 S. Jefferson St., New Castle, Pa.  
 Pennsylvania Furnace & Iron Co., Pine St., Warren, Pa.  
 Penn Ventilating Co., 2812 Richmond St., Philadelphia, Pa.  
 Peetecost & Craft Co., 429 Wabash Ave., Terre Haute, Ind.  
 Peoples Oil Burner Co., 466 W. Superior St., Chicago, Ill.  
 Perfect Burner Co., 294 Broad St., Lynn, Mass.  
 Perfetaire Corp., 1102 N. Charles St., Baltimore, Md.  
 Perfection Grate & Stoker Co., 4 Fisk Ave., Springfield, Mass.  
 • Perfection Stove Co., 7609 Platt Ave., Cleveland, O.  
 Perfex Corp., 415 W. Oklahoma Pl., Milwaukee, Wis.  
 Perkins Machine Co., 4 Perkins Ave., Warren, Mass.  
 Perkinson & Brown, 412 N. Lincoln St., Chicago, Ill.  
 Perrin Co., Edward C., 3rd & Grant Sts., Camden, N. J.  
 Petroleum Heat & Power Co., 110 Davenport St., Stamford, Conn.  
 Pfantstiel Chemical Co., 104 Lakeview Ave., Waukegan, Ill.  
 Pfeiffer, Wm., 416 Greenwich St., New York City.  
 Phillips Heating, Ventilating & Mfg. Co., 1710 W. Washington St., Los Angeles, Cal.  
 Piatt Products Corp., 1149 S. Pennsylvania Ave., Lansing, Mich.  
 Pierce & Stevens, Inc., 710 Ohio St., Buffalo, N. Y.  
 Pier Equipment Mfg. Co., 1440 Milton St., Benton Harbor, Mich.  
 Pilley Packing and Flue Brush Mfg. Co., 606 S. 3rd St., St. Louis, Mo.  
 Pioneer Air Conditioning Corp., 1300 Stevens Ave., Minneapolis, Minn.  
 Pioneer Heat Regulator Division, Master Electric Co., 100 Davis Ave., Dayton, Ohio.  
 Pioneer Oil Burner Co., 714 Oakland N. E., Cedar Rapids, Ia.  
 Pittsburgh Equitable Meter Co., 400 N. Lexington Ave., Pittsburgh, Pa.  
 Pittsburgh Furnace Parts Co., 1235 Pennsylvania Ave., N. S., Pittsburgh, Pa.  
 Pittston Stove Co., P. O. Box 29, Pittston, Pa.  
 Plastic Products Co., 6475 Georgia Ave., Detroit, Mich.  
 Plibrico Jointless Firebrick Co., 1800 Kingsbury St., Chicago, Ill.  
 Plymouth Cordage Co., Court St., North Plymouth, Mass.  
 Plymouth Industries, Inc., 1932 Harrison Ave., Plymouth, Ind.  
 • Poe, Ralph W., 44 White Ct., Canton, Ill.  
 Polar Air, Inc., 100 N. Ewing, Dallas, Texas.  
 Polk Mfg. Co., 2021-23 Winnebago St., Madison, Wis.  
 Pomona Pump Co., 206 E. Commercial St., Pomona, Cal.  
 Portland Stove Fdry Co., Portland, Me.  
 Potomac Mfg. Co., 316 S. 10th St., Philadelphia, Pa.  
 Power King Tool Corp., 310 E. Market St., Warsaw, Ind.  
 Powers Regulator Co., 2720 Greenview Ave., Chicago, Ill.  
 Practical Instrument Co., 2713 N. Ashland Ave., Chicago, Ill.  
 Precision Thermometer & Instrument Co., 1434 Brandywine St., Philadelphia, Pa.  
 Preferred Utilities Manufacturing Corp., 33 W. 60th St., New York City.  
 • Premier Division, Electric Vacuum Cleaner Co., Inc., 1734 Ivanhoe Rd., Cleveland, O.  
 • Premier Furnace Co., Box 150, Dowagiac, Mich.  
 Presstite Engineering Co., 3900 Chouteau St., St. Louis, Mo.  
 Pressure Oil Burners, Inc., 55 N. Broad St., York, Pa.  
 Propellair, Inc., 1345 Lagonda Ave., Springfield, O.  
 Providence Cornice Co., 309 Canal St., Providence, R. I.  
 Pryne & Co., Inc., 1245 E. 33rd St., Los Angeles, Cal.  
 Puhl & Hepper Mfg. Co., Inc., 6400 W. Florissant Ave., St. Louis, Mo.  
 Pulvokol, Inc., 406 S. Second Ave., Minneapolis, Minn.  
 Pyott Foundry & Machine Co., 328 N. Sangamon St., Chicago, Ill.  
 • Pyrolite Products Co., 1221-31 W. 74th St., Cleveland, O.



## Q

Quaker Mfg. Co., 223 W. Erie St., Chicago, Ill.  
 Quickwork Co., 900 N. Spaulding Ave., Chicago, Ill.  
 Quimby Pump Co., Inc., 340 Thomas St., Newark, N. J.

## R

R-S Products Corp., 4530 Germantown Ave., Philadelphia, Pa.  
 Racine Sheet Metal Works, Olive & Lathrop Sts., Racine, Wis.  
 Racine Stoker Mfg. Co., 1014 Eighth St., Racine, Wis.  
 Ranco, Inc., 601 W. Fifth Ave., Columbus, Ohio.  
 Rafter Machine Co., 259 Stephen St., Belleville, N. J.  
 Ramey Mfg. Co., 243 N. 5th St., Columbus, O.  
 Ramtite Co., Division of S. Obermayer Co., 2563 W. 18th St., Chicago, Ill.  
 • Randall Graphite Products Corp., 609 W. Lake St., Chicago, Ill.  
 Ravenna Furnace & Heating Co., Ravenna, O.  
 Rawplug Co., Inc., The, 98 Lafayette St., New York City.  
 Ray Oil Burner Co., 401-499 Bernal Ave., San Francisco, Cal.  
 Reading Iron Co., 401 N. Broad St., Philadelphia, Pa.  
 Red Jacket Mfg. Co., Davenport, Ia.  
 Redi Automatic Coal Burners, Inc., N. 107 Freya St., Spokane, Wash.  
 Reed Unit-Fans, Inc., 811 St. Charles St., New Orleans, La.  
 Reeves Steel & Mfg. Co., Dover, O.  
 Refrigeration Appliances, Inc., 923 W. Lake St., Chicago, Ill.  
 • Refrigeration & Air Conditioning Institute, 2130-58 Lawrence Ave., Chicago, Ill.  
 Rega Mfg. Co., 79 Mt. Hope Ave., Rochester, N. Y.  
 • Register & Grille Mfg. Co., Inc., 70 Berry St., Brooklyn, N. Y.  
 Reichert Float & Mfg. Co., 2238 Smead Ave., Toledo, O.  
 Reif-Rexoll, Inc., 37 Carroll St., Buffalo, N. Y.  
 Reilly Tar & Chemical Co., 1615 Merchants Bank Bldg., Indianapolis, Ind.  
 Reliable Perforating Co., 2047 N. Wood St., Chicago, Ill.  
 Reliance Electric & Engineering Co., 1088 Ivanhoe Rd., Cleveland, O.  
 Reliance Refrigeration Machine Co., 3401 N. Kedzie Ave., Chicago, Ill.  
 Rempe Coil Co., 340 N. Sacramento Ave., Chicago, Ill.  
 Republic Flow Meters Co., 2258 Diversey Ave., Chicago, Ill.  
 • Republic Steel Corp., Republic Bldg., Cleveland, O.  
 Research Corp., 405 Lexington Ave., New York City.  
 Revere Copper and Brass Incorporated, 230 Park Ave., New York City.  
 Reynolds Corp., 19 Rector St., New York City.  
 Reynolds Manufacturing Co., 412 Prospect N. E., Grand Rapids, Mich.  
 Rex Clay Products Company, 14414 Dexter Blvd., Detroit, Mich.  
 Resnor Mfg. Co., Mercer, Pa.  
 Rhoads & Sons, J. E., 11th & B. & O. R. R., Wilmington, Del.  
 Rhodes, Inc., M. H., 30 Bartholomew Ave., Hartford, Conn.  
 Ribside Furnace Co., 119½ Clinton St., Wausau, Wis.  
 Richards-Wilcox Mfg. Co., Third St., Aurora, Ill.  
 Richardson & Boynton Co., 244 Madison Ave., New York City.  
 Richmond Fireproof Door Co., Richmond, Ind.  
 Ripley Co., W. R., 318 N. "E" St., Tacoma, Wash.  
 Risdon Stoker Corp., 6355 Rainier Ave., Seattle, Wash.  
 Rising & Nelson Slate Co., West Pawlet, Vt.  
 Roan Mfg. Co., 1220 Washington Ave., Racine, Wis.  
 Robbins & Myers, Inc., 1345 Lagonda Ave., Springfield, O.  
 Roberts-Gordon Appliance Corp., 137 Arthur St., Buffalo, N. Y.  
 Roberts-Hamilton Co., 707-715 S. Third St., Minneapolis, Minn.  
 Robertshaw Thermostat Co., Youngwood, Pa.  
 Robertson Co., H. H., Grant Bldg., Pittsburgh, Pa.  
 Robertson Machine & Fdry. Co., W., 58 Rano St., Buffalo, N. Y.  
 Robeson Engineering Co., 290 Sanford St., East Orange, N. J.  
 Robinson Furnace Co., 213 W. Austin Ave., Chicago, Ill.  
 Robinson Heating & Ventilating Corp., 632-646 Erie St., S., Massillon, O.  
 Rochester Lead Works, Inc., 380 Exchange St., Rochester, N. Y.  
 • Rock Island Register Co., 2435 Fifth Ave., Rock Island, Ill.  
 Rock Island Stove Co., 200 Fourth St., Rock Island, Ill.  
 Rock River Machine Co., Inc., N. Main St., Janesville, Wis.  
 Rockwood Mfg. Co., 1801 English Ave., Indianapolis, Ind.  
 Rock Wool Products Co., Inc., P. O. Box 276, Wabash, Ind.  
 Roebling's Sons Co., John A., 640 S. Broad St., Trenton, N. J.  
 Roller Bearing Co. of America, Whitehead Rd., Trenton, N. J.  
 Rome-Turney Radiator Co., Canal St., Rome, N. Y.  
 Root-Connersville Blower Corp., Connersville, Ind.  
 Roper Corp., Geo. D. Blackhawk Ave., Rockford, Ill.  
 Rosebraugh Co., W. W., 680 S. 17th St., Salem, Ore.  
 Rosedale Foundry & Machine Co., Columbus Ave., N. S., Pittsburgh, Pa.  
 Rotary Mfg. Co., 5718 Long Beach Ave., Los Angeles, Cal.  
 • Round Oak Co., Dowagiac, Mich.  
 Roxalin Flexible Lacquer Co., 800 Magnolia Ave., Elizabeth, N. J.  
 Royal Air Conditioning Equipment, 1900 Alameda Blvd., Compton, Cal.

Royal-Apex Mfg. Corp., 62 Schenectady Ave., Brooklyn, N. Y.  
 Royal Ventilator Co., 415 Locust St., Philadelphia, Pa.  
 Ruberoid Co., The, 500 Fifth Ave., New York City.  
 Ruby Chemical Co., 66 McDowell St., Columbus, O.  
 Rudy Furnace Co., Dowagiac, Mich.  
 Rupp Forge & Shear Co., 10312 Meech Ave., Cleveland, O.  
 Russell Electric Co., 342 W. Huron St., Chicago, Ill.  
 Russell Insulation Co., F. C., 3925 S. Hanover St., Baltimore, Md.  
 Russell Mfg. Co., John M., Naugatuck, Conn.  
 Rutland Fire Clay Co., Curtis Ave., Rutland, Vt.  
 • Rybolt Heater Co., Miller St., Ashland, O.  
 • Ryerson & Son, Inc., Joseph T., 2558 W. 16th St., Chicago, Ill.  
 Ryniker Sheet Metal Works, Inc., 122-124 N. 25th St., Billings, Mont.

## S

S K F Industries, Inc., Front St. & Erie Ave., Philadelphia, Pa.  
 Safe Automatic Heat Control Co., 16512 Wark Ave., Detroit, Mich.  
 Saino Mfg. Co., Inc., F. L., 70 W. Colorado Ave., Memphis, Tenn.  
 St. Clair Foundry Corp., Beech & Wilson Sts., Centralia, Ill.  
 • St. Louis Technical Institute, 4541 Clayton Ave., St. Louis, Mo.  
 St. Paul Corrugating Co., Wabash & Water Sts., St. Paul, Minn.  
 • Sall Mountain Co., 176 W. Adams St., Chicago, Ill.  
 Sallada Mfg. Co., 3816 Grand Ave., S., Minneapolis, Minn.  
 Sangamo Electric Co., 1301 N. 11th St., Springfield, Ill.  
 Sauereisen Cements Co., 2308 Main St., Sharpsburg Station, Pittsburgh, Pa.  
 Savage Co., W. J., 912 W. Clinch Ave., Knoxville, Tenn.  
 • Schaefer Brush Mfg. Co., 117 W. Walker St., Milwaukee, Wis.  
 Schatz Mfg. Co., Fairview, Poughkeepsie, N. Y.  
 Schatz Venetian Blinds, Los Angeles, Cal.  
 Schecter Brothers Co., Front & Cumberland Sts., Philadelphia, Pa.  
 Schill Mfg. Co., Mansfield St., Crestline, O.  
 Schoedinger Co., F. O., 322-358 Mt. Vernon Ave., Columbus, O.  
 Schundler & Co., Inc., F. E., 45-15 Vernon Blvd., Long Island City, N. Y.  
 • Schwab Furnace & Mfg. Co., 193 S. Second St., Milwaukee, Wis.  
 • Schwitzer-Cummins Co., Fan St., Indianapolis, Ind.  
 Scott-Newcomb, Inc., 1929 Pine St., St. Louis, Mo.  
 Scovill Mfg. Co., Morency-Van Buren Div., Prairie Ave., Sturgis, Mich.  
 Sealkote Corp., 40 S. Clinton St., Chicago, Ill.  
 Security Stove & Mfg. Co., 1630 Oakland, Kansas City, Mo.  
 Seep-Lok Flashing Co., Inc., 63 Hawthorne Ave., Yonkers, N. Y.  
 Self-Vulcanizing Rubber Co., Inc., 605 W. Washington Blvd., Chicago, Ill.  
 Sentry Mfg. Co., 505 Baum Bldg., Omaha, Nebr.  
 Serval, Inc., 119 Morton Ave., Evansville, Ind.  
 Service Machine Co., 750-760 Broadway, Elizabeth, N. J.  
 Shamblen Furnace Parts Co., 231-39 First Ave., Pittsburgh, Pa.  
 Shakeproof Lock Washer Co., 2501 N. Keeler Ave., Chicago, Ill.  
 Sharon Steel Corp., Sharon, Pa.  
 Shedlov Oil Burners, Inc., 717 Third Ave., S., Minneapolis, Minn.  
 Sheer Co., H. M., 2nd & Hampshire Sts., Quincy, Ill.  
 Sheet Metal Products Co., 320 S. Commercial St., Peoria, Ill.  
 Sheldon Slate Co., F. C., Granville, N. Y.  
 Sight Feed Generator Co., 14 N. Tenth St., Richmond, Ind.  
 Signal Electric Mfg. Co., Menominee, Mich.  
 Silent Glow Oil Burner Corp., 1477 Park St., Hartford, Conn.  
 Silent Sioux Oil Burner Corp., Orange City, Ia.  
 Simplex Manufacturing Co., 200 North Main St., Fond du Lac, Wisc.  
 Simplex Oil Heating Corp., 30 Church St., New York City.  
 Sinker-Davis Co., 230 S. Missouri St., Indianapolis, Ind.  
 Sioux City Foundry and Boiler Co., East 8th & Division Sts., Sioux City, Iowa.  
 Skilbeck Mfg. Co., 6721 26th Ave., Kenosha, Wis.  
 • Skillsaw, Inc., 3302 Elston Ave., Chicago, Ill.  
 Skinner Co., E. W., 402 Pearl St., Fitchburg, Mass.  
 Skuttle Co., J. L., 999 Franklin St., Detroit, Mich.  
 Sly Mfg. Co., W. W., 4700 Train Ave., Cleveland, O.  
 Smith & Co., F. L., 225 Broadway, New York City.  
 Smith & Kanzler, Inc., 516 Lidgerwood Ave., Elizabeth, N. J.  
 Smith, Inc., Winfield H., Eaton St., Springfield, N. Y.  
 Smith Heater Co., Peter, 6209 Hamilton St., Detroit, Mich.  
 Smith Welding Equipment Corp., 2619-33 Fourth St., S. E., Minneapolis, Minn.  
 Smuck-Thiele Co., 410 W. Tenth St., Indianapolis, Ind.  
 Snap-On Mfg. Co., 1028 Blue Island Ave., Chicago, Ill.  
 Somers, Inc., H. J., 6063 Wabash Ave., Detroit, Mich.  
 Sonner Burner Co., 6th & Andrews, Winfield, Kan.  
 Southbridge Roofing Co., Inc., Hartwell & Chapin Sts., Southbridge, Mass.  
 Southern States Iron Roofing Co., Stiles Ave., Savannah, Ga.



Southworth Machine Co., 30 Warren Ave., Portland, Maine.  
 Spear Stove & Heating Co., James, 1823 Market St., Philadelphia, Pa.  
 Specialty Converters, Inc., 161 E. Erie St., Chicago, Ill.  
 Speedway Mfg. Co., 1854 S. 52nd Ave., Cicero, Ill.  
 Spencer Air Conditioning Service, 1237 Acoma St., Denver, Colo.  
 Spencer Heater Division, Ft. Park St., Williamsport, Pa.  
 Spencer Thermostat Co., 34 Forest St., Attleboro, Mass.  
 Spencer Turbine Co., 484 New Park Ave., Hartford, Conn.  
 Spray Engineering Co., 114 Central St., Somerville, Mass.  
 Spray-Flake Co., 2715 Irving Park Blvd., Chicago, Ill.  
 Spray-Wheel Air Conditioners, Inc., 1320 19th St., Denver, Colo.  
 Springman Metal Specialty Co., 424 Bellevue Ave., Detroit, Mich.  
 Spun Steel Corp., 2037 Dueber Ave., S. W., Canton, O.  
 Square D Co., 6060 Rivard St., Detroit, Mich.  
 Standard Air Conditioning, Inc., 40 W. 40th St., New York City.  
 Standard Asbestos Mfg. Co., 820-22 W. Lake St., Chicago, Ill.  
 Standard Engineering Works, 289 Roosevelt Ave., Pawtucket, R. I.  
 • Standard Foundry & Furnace Co., 1801 Pleasant St., De Kalb, Ill.  
 Standard Fuel Engineering Co., 667 Post Ave., South, Detroit, Mich.  
 Standard Furnace & Supply Co., 407-13 S. 10th St., Omaha, Nebr.  
 Standard Galvanizing Co., 2619 W. Van Buren St., Chicago, Ill.  
 Standard Heating & Radiator Co., 704 Second Ave., Pittsburgh, Pa.  
 Standard Lime & Stone Co., 2004 First National Bank Bldg., Baltimore, Md.  
 Standard Rolling Mills, Inc., 143 Jewell St., Brooklyn, N. Y.  
 Standard Stamping & Perforating Co., 3131 W. 49th Pl., Chicago, Ill.  
 Standard Ventilator Co., Lewisburg, Pa.  
 Stanley Electric Tool Div., The Stanley Works, Elm St., New Britain, Conn.  
 Stanley Rule & Level Plant, New Britain, Conn.  
 Stanton Heater Co., Martins Ferry, O.  
 Star Electric Motor Co., 197 Grove St., Bloomfield, N. J.  
 Star Radiator Co., 649 Ceres Ave., Los Angeles, Cal.  
 Staynew Filter Corp., 25 Leighton Ave., Rochester, N. Y.  
 Steel and Tubes, Inc., 224 E. 131st St., Cleveland, O.  
 Steel Products Engineering Co., Columbia St. at Dakota Ave., Springfield, O.  
 Steelweld Machinery Co., E. 70th & Machinery Ave., Cleveland, O.  
 Steen-Dyer Mfg. Co., 5204 E. 15th St., Kansas City, Mo.  
 Sterling Foundry Co., Sterling, Ill.  
 Ster-Na-Man Fdry Co., 441 Williams St., Springfield, Ill.  
 Stewart Foundry, O. S., 887 E. 67th St., Cleveland, O.  
 Stewart Furnace Co., 2250 Oliver Bldg., Pittsburgh, Pa.  
 Stewart Ice Machine Co., 1046 East 22nd St., Los Angeles, Cal.  
 Stiglitz Furnace & Foundry Co., 2007-23 Portland Ave., Louisville, Ky.  
 Stilphen Engineering & Mfg. Co., C. A., 1129 Eighteenth St., Denver, Colo.  
 Sto-Coke Incorporated, 1511 E. Michigan, Indianapolis, Ind.  
 Stok-A-Fire Co., 900 S. 23rd St., St. Louis, Mo.  
 Stokerette Mfg. Co., 4540 Ravenswood Ave., Chicago, Ill.  
 Stokermatic Co., 1415 S. State St., Salt Lake City, Utah.  
 Stoker Products, Inc., 221 W. Prairie Ave., Decatur, Ill.  
 Stokers, Inc., 10321 E. Jefferson Ave., Detroit, Mich.  
 Stover Mfg. & Engine Co., N. Henderson Ave., Freeport, Ill.  
 Stran-Steel Division, Great Lakes Steel Corp., 6100 McGraw Ave., Detroit, Mich. (Ecorse Plant)  
 Stratton & Teratogge Co., 15th & Main St., Louisville, Ky.  
 Streamline Pipe & Fittings Div., Mueller Brass Co., Port Huron, Mich.  
 Structural Slate Co., Robinson Ave., Pen Argyl, Pa.  
 Sturtevant Co., B. F., Damon St., Hyde Park, Boston, Mass.  
 Summerheat Co., 406 S. Columbia, South Bend, Ind.  
 Sundstrand Engineering Co., 1327 Seventh St., Rockford, Ill.  
 Sun-Ray Oil Burner Corp., 114-02 Beach Channel Dr., Rockaway Park, N. Y.  
 • Superior Sheet Steel Co., The Division of Continental Steel Corp., Canton & Louisville Rd., Canton, O.  
 Superior Steel Corp., Grant Bldg., Pittsburgh, Pa.  
 Superstat Co., 33 Walter St., Springfield, Mass.  
 Supreme Electric Products Corp., 103 Mt. Hope Ave., Rochester, N. Y.  
 Supreme Heater & Ventilating Corp., 1911 N. Market St., St. Louis, Mo.  
 • Surface Combustion Corp., 2375 Dorr St., Toledo, O.  
 Swaby Mfg. Co., 2010-2014 Marshall Blvd., Chicago, Ill.  
 Swaine Mfg. Co., Fred J., 1800 N. Seventh St., St. Louis, Mo.  
 • Swartwout Co., 18615 Euclid Ave., Cleveland, O.  
 Swedish Venetian Blind Co., 601 W. 26th St., New York City.  
 Swift Corp., Carl E., North Side, Holland, Mich.  
 Swift Mfg. Company, 247 McDougall Ave., Detroit, Mich.  
 Synco-Flame Burner Corp., 1200 Park St., Hartford, Conn.  
 Synchronic Air Conditioning Corp., 3373 N. Holton St., Milwaukee, Wis.  
 Syracuse Fire Door Corp., 900 Canal St., Syracuse, N. Y.

## T

Taco Heaters, Inc., 342 Madison Ave., New York City.  
 Tagliabue Mfg. Co., C. J., Park & Nostrand Aves., Brooklyn, N. Y.  
 Tamma Silica Co., 228 N. La Salle St., Chicago, Ill.  
 Tannewitz Works, 315 Front Ave., N. W., Grand Rapids, Mich.  
 Tatro Brothers, Inc., 218 Washington St., Decorah, Ia.  
 Taylor Co., N. & G., Div. Republic Steel Co., Cumberland, Md.  
 Taylor-Hall Welding Corp., 99 Hope Ave., Worcester, Mass.  
 Taylor Instrument Companies, 95 Ames St., Rochester, N. Y.  
 Taylor-Winfield Corp., 1052 Mahoning Ave., N. W., Warren, O.  
 Technical Coatings, Inc., 9-15 Park Place, New York City.  
 Tecumseh Products Co., Tecumseh, Mich.  
 Teesdale Mfg. Co., 427 Market St., Grand Rapids, Mich.  
 Tem Products Co., 12 Hogue St., Youngstown, O.  
 Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.  
 Texo Sales & Mfg. Co., 47 Walnut St., Cincinnati, O.  
 Thatcher Furnace Company, 39 St. Francis St., Newark, N. J.  
 Thermal Units Mfg. Co., Meriden, Conn.  
 Therminsul Corp., 1603 Fulford St., Kalamazoo, Mich.  
 Thermoid Rubber, Div. of Thermoid Co., Whitehead Rd., Trenton, N. J.  
 Thompson & Company, Box 6757, Pittsburgh, Pa.  
 Thompson Mfg. Co., 30th & Larimer Sts., Denver, Colo.  
 Thomson-Gibb Electric Welding Co., 161 Pleasant St., Lynn, Mass.  
 ThruBond Flashing Corp., 525 E. 136th St., New York City.  
 Tidewater Engineering Co., Gloucester, Mass.  
 Tierney Rotor Ventilator Co., 239 4th Ave., S., Minneapolis, Minn.  
 Tiffin Art Metal Co., Broad & Second Ave., Tiffin, O.  
 Tillery's Little Janitor Clock Co., 55-57 Orchard St., Newark, N. J.  
 Timken Silent Automatic Div., Timken-Detroit Axle Co., 100 Clark Ave., Detroit, Mich.  
 Todd Combustion Equipment, Inc., Ft. of 23rd St., Brooklyn, N. Y.  
 Torchweld Equipment Co., 1035 W. Lake St., Chicago, Ill.  
 Tork Clock Co., Inc., 31 South St., Mt. Vernon, N. Y.  
 Torrington Mfg. Co., 70 Franklin St., Torrington, Conn.  
 Townsend Co., New Brighton, Pa.  
 • Trane Co., The, La Crosse, Wis.  
 Trenton Auto Radiator Wks., 630 Brunswick Ave., Trenton, N. J.  
 Trimount Rotary Power Co., 296 Whiting Ave., East Dedham, Mass.  
 Triox Engineering Co., 207 Board of Education Bldg., St. Louis, Mo.  
 Tropic-Air Stoker Co., 401 Schroyer Ave., S. W., Canton, Ohio.  
 Tropical Paint & Oil Co., 1244-86 W. 70th St., Cleveland, O.  
 Trumbull Electric Mfg. Co., Woodford Ave., Plainville, Conn.  
 Truscon Laboratories, 1710 Caniff Ave., Detroit, Mich.  
 Truscon Steel Co., Albert St., Youngstown, O.  
 Turner & Seymour Mfg. Co., Lawton St., Torrington, Conn.  
 Turner Brass Works, 823 Park Ave., Sycamore, Ill.  
 Turney Corp., Muskegon, Mich.  
 Tuttle Air Filter Co., Inc., 1014 W. Main St., Louisville, Ky.  
 • Tuttle & Bailey, Inc., Corbin Ave., New Britain, Conn.  
 • Twentieth Century Heating & Ventilating Co., Ira & Edison Ave., Akron, O.

## U

Uehling Instrument Co., 473 Getty Ave., Paterson, N. J.  
 Una Welding, Inc., 1615 Collamer Ave., Cleveland, O.  
 Unified Air Conditioner Co., 322 W. Michigan St., Duluth, Minn.  
 Uniflow Mfg. Co., East Lake Road, Erie, Pa.  
 Union Fibre Co., Inc., Winona, Minn.  
 Union Steam Pump Co., Jefferson Ave., Battle Creek, Mich.  
 Unit Heater & Cooler Co., 1002-1024 Third St., Wausau, Wis.  
 United American Bosch Corp., 3664 Main St., Springfield, Mass.  
 United Cork Companies, Central Ave. & N. J. Central R. R., Kearny, N. J.  
 United Electric Controls Co., 69 "A" St., South Boston, Mass.  
 United Motors Service, Detroit, Mich.  
 • U. S. Air Conditioning Corp., 2105 Kennedy St., N. E., Minneapolis, Minn.  
 United States Brass & Copper Co., Hyde Park Ave., Hyde Park, Mass.  
 United States Burner Corp., 191 Franklin Ave., Hartford, Conn.  
 U. S. Cistern Filter Mfg. Co., The, 509 S. McClun St., Bloomington, Ill. (Strainers)  
 United States Gypsum Co., 300 W. Adams St., Chicago, Ill.  
 U. S. Mineral Wool Co., 280 Madison Ave., New York City.  
 United States Radiator Corp., 1056 National Bank Bldg., Detroit, Mich.  
 • United States Register Co., Burnham St., Battle Creek, Mich.  
 • United States Steel Corp., Pittsburgh, Pa.  
 Uni-Therm, Inc., P. O. Box 83, Elyria, O.  
 Universal Air Filter Corp., 332 W. Michigan St., Duluth, Minn.

- Universal Blower Co., 124 S. Woodward Ave., Birmingham, Mich.  
 • Universal Cooler Corp., 7214 Melville St., Detroit, Mich.  
 Universal-Cyclops Steel Corp., Bridgeville, Pa. and Titusville, Pa.  
 Universal Power Corp., 4300 Euclid, Cleveland, O.  
 Uno Ventilator Co., 339 Lincoln Ave., Cliftondale, Mass.  
 Upson Co., The, Upson Point, Lockport, N. Y.  
 Utica Radiator Corp., 2201 Dwyer Ave., Utica, N. Y.  
 • Utility Fan & Mfg. Co., 2528 Santa Fe Ave., Los Angeles, Cal.

## V

- Vail Mfg. Co., 1017 Columbia Ave., Fort Wayne, Ind.  
 Valley Mfg. Co., Fryeville, Athol, Mass.  
 Van Noorden Co., E., 100 Magazine St., Boston, Mass.  
 Van Osdol Mfg. Co., N. K., 133 W. 46th St., Indianapolis, Ind.  
 Vendor Slate Co., Inc., P. O. Box 204, Nazareth, Pa.  
 Vent-O-Lite Co., 4230 W. Taylor St., Chicago, Ill.  
 Vento Steel Sash Co., Muskegon, Mich.  
 Vibration Eliminator Co., 2508-37th Ave., Long Island City, N. Y.  
 • Victor Electric Products, Inc., 737 Reading Rd., Cincinnati, O.  
 Victor Equipment Co., Kimball-Krogh Pump Div., 1010 E. 62nd St., Los Angeles, Cal.  
 Victor Oil Burner Mfg. Co., 45 Allyn St., Hartford, Conn.  
 Vigor-Aire Corp., 127 S. Fifth St., Philadelphia, Pa.  
 Viking Air Conditioning Corp., Main & Center Sts., N. W., Cleveland, O.  
 Viking Mfg. Co., 600 S. High St., Akron, Ohio.  
 Viking Pump Co., 404 State St., Cedar Falls, Ia.  
 • Viking Shear Co., Raspberry St. and Nickel Plate R. R., Erie, Pa.  
 Vilter Mfg. Co., 2217 S. First St., Milwaukee, Wis.  
 Volcano Burner Corp., 575 E. 184th St., New York City.  
 Von Seebeck, G., 50 Pine St., New York City.  
 • Voorhees, G. A., 633 S. Delaware, Indianapolis, Ind.  
 Vulcan Elec. Mfg. Co., 2001 Obear St., St. Louis, Mo.

## W

- Waddell, Bruce, 2829 Northwestern Ave., Indianapolis, Ind.  
 Wagner, C. DeWitt, 1000 2nd St., S. E., Cedar Rapids, Ia.  
 Wagner Electric Corp., 6400 Plymouth Ave., St. Louis, Mo.  
 Walker & Pratt Mfg. Co., 31-35 Union St., Boston, Mass.  
 Walker Mfg. & Sales Corp., 1711-1717 Penn St., St. Joseph, Mo.  
 Wall Mfg. Supply Co., P., 3126 Preble Ave., Pittsburgh, Pa.  
 Walsh Refractories Corp., 4430 N. First St., St. Louis, Mo.  
 Ward Co., H. H., Chester, Pa.  
 Ward Heater Co., Ltd., 1800 W. Washington Blvd., Los Angeles, Cal.  
 Ward Leonard Electric Co., 37 South St., Mt. Vernon, N. Y.  
 • Ward Machinery Co., 564 W. Washington Blvd., Chicago, Ill.  
 Ward Mfg. Co., 107-11 E. Milwaukee Ave., Detroit, Mich.  
 Warren Shade Co., Inc., 2905 E. Hennepin Ave., Minneapolis, Minn.  
 Washington Stove Works, 3402-22 Smith Ave., Everett, Wash.  
 Waterfilm Boilers, Inc., 154 Ogden Ave., Jersey City, N. J.  
 • Waterloo Register Co., Waterloo, Ia.  
 • Waterman-Waterbury Co., 1123 Jackson St., N. E., Minneapolis, Minn.  
 Watson Co., Inc., Jas. H., Bradley, Ill.  
 Wattenamel Co., 7400 Archer Ave., Summit, Ill.  
 Watts Regulator Co., 10 Embankment St., Lawrence, Mass.  
 Wayne Oil Burner Corp., 800 Glasgow Ave., Fort Wayne, Ind.  
 Wayne Pattern & Foundry Co., 236 Murray St., Fort Wayne, Ind.  
 Weatherhead Co., 620 Frankfort St., Cleveland, O.  
 Webster Electric Co., Dekoven Ave. & Clark St., Racine, Wis.  
 Well Pump Co., 215 W. Superior St., Chicago, Ill.  
 Weinman Pump Co., 290 Spruce St., Columbus, O.  
 Weirton Steel Co., Weirton, W. Va.  
 Weiskittel Co., Inc., Harry C., 4901 Philadelphia Rd., Baltimore, Md.  
 Weiss & Co., H., 113-115 Mercer St., New York City.  
 Welded Steel Products Co., 534 N. 9th St., Milwaukee, Wis.  
 Weldex, Inc., 9666 E. Jefferson St., Detroit, Mich.  
 Welding Apparatus Co., 4309 Ogden Ave., Chicago, Ill.  
 Welding Timer Mfg. Co., 251 Ogden St., Newark, N. J.  
 Wells Mfg. Corp., 315 Seventh Ave., Three Rivers, Mich.  
 Westchester Home Equipment Co., Inc., 432 Austin Pl., Bronx, N. Y.  
 Western Blower Co., 1800 Airport Way, Seattle, Wash.  
 Western Felt Works, 4027 Ogden Ave., Chicago, Ill.  
 Western Furnaces, Inc., 3002-18 S. Chandler St., Tacoma, Wash.  
 Western Rotary Ventilator Co., Inc., 1720 E. 14th St., Los Angeles, Cal.  
 Western Venetian Blind Co., 601 W. 26th St., New York City.  
 Western Wire & Iron Works, Inc., 945 W. 18th Pl., Chicago, Ill.  
 Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa.  
 Westinghouse Electric & Mfg. Co., 246 East Fourth St., Mansfield, Ohio.  
 Weston Electrical Instrument Corp., 614 Frelinghuysen Ave., Newark, N. J.  
 Westwick & Son, Inc., John, Claude & Meeker Sts., Galena, Ill.

- Wheeling Corrugating Co., Wheeling Steel Bldg., Wheeling, W. Va.  
 Wheeling Metal & Mfg. Co., Box 56, Wheeling, W. Va.  
 Wheeling Steel Corp., Wheeling Steel Bldg., Wheeling, W. Va.  
 White Co., Kelvin & Wilfred B., 90 State St., Boston, Mass.  
 • White Mfg. Co., 2362 University Ave., St. Paul, Minn.  
 White & Company, Haydn F., 1740 E. 12th St., Cleveland, Ohio.  
 White-Rodgers Electric Co., 1209 Cass Ave., St. Louis, Mo.  
 Whiting Corp., Harvey, Ill.  
 Whitlock Coil Pipe Co., 100 South St., Hartford, Conn.  
 • Whitney Mfg. Co., W. A., 636 Race St., Rockford, Ill.  
 • Whitney Metal Tool Co., 91 Forbes St., Rockford, Ill.  
 Wickwire Spencer Steel Co., 41 E. 42nd St., New York City.  
 Wiedemann Machine Co., 1815 Sedgley Ave., Philadelphia, Pa.  
 Wilcolator Co., 17 Nevada St., Newark, N. J.  
 Wilder Mfg. Co., P. O. Box 189, Niles, Ohio.  
 Wilhelm Co., A., 3rd & Bern Sts., Reading, Pa.  
 Willard Metallic Crypt Co., Air Conditioning Div., Willard, Ohio.  
 Will-Burt Co., Orrville, O.  
 Williams Oil-O-Matic Heating Corp., 1201 E. Bell, Bloomington, Ill.  
 Williamson Heater Co., 337 W. Fifth St., Cincinnati, O.  
 Willis Mfg. Co., 156 N. Academy St., Galesburg, Ill.  
 Will-Weld Mfg. Co., Inc., 600-620 S. 15th St., Omaha, Nebr.  
 Wilson & Co., Inc., 4100 S. Ashland Ave., Chicago, Ill.  
 Wilson Co., H. A., 97 Chestnut St., Newark, N. J.  
 Wilson, Inc., Grant, 4101 W. Taylor St., Chicago, Ill.  
 Wilson Welder & Metals Co., Inc., 956 38th St., North Bergen, N. J.  
 Winchester Repeating Arms Co., 275 Winchester Ave., New Haven, Conn.  
 Windshield Soupper Co., Div. Sargent Bldg. Specialties Co., 16 Warren St., New York City.  
 Wing Mfg. Co., L. J., 154 W. 14th St., New York City.  
 Winkler Mfg. Corp., Lebanon, Ind.  
 Wisconsin Humidifier Co., 3231 N. Richards St., Milwaukee, Wis.  
 • Wise Furnace Co., 101 Lincoln St., Akron, O.  
 • Wiss & Sons Co., J., 33 Littleton Ave., Newark, N. J.  
 Wittenmeier Machinery Co., 850 N. Spaulding Ave., Chicago, Ill.  
 • Wodack Electric Tool Corp., 4627 W. Huron St., Chicago, Ill.  
 Wolfe Engineering & Mfg. Co., 1136 Market St., Harrisburg, Pa.  
 Wolff Coal Saver Co., 1330 W. Congress St., Chicago, Ill.  
 Wolverine Blower Works, 412 Prospect Ave., Grand Rapids, Mich.  
 Wolverine Tube Co., 1419 Central Ave., Detroit, Mich.  
 Wood Conversion Co., First National Bank Bldg., St. Paul, Minn.  
 Wood Industries, Inc., Gar, 7924 Riopelle St., Detroit, Mich.  
 Wood Steel Co., Alan, Conshohocken, Pa.  
 Wood's Sons Co., T. B., Fifth Ave., Chambersburg, Pa.  
 Woodard & Co., Thos. S., 846 Clinton Ave., South, Rochester, N. Y.  
 Woolery Machine Co., 2919 Como Ave., S. E., Minneapolis, Minn.  
 Woolwine Metal Products Co., Atlantic Blvd. & S. Riverside Dr., Los Angeles, Cal.  
 Wooster Art Wood, Inc., P. O. Box 198, Wooster, O.  
 Worcester Brush & Scraper Co., Div. Mason Worcester Co., 33 Austin St., Worcester, Mass.  
 World Kalamain Sash & Door Corp., 448 Tiffany St., New York City.  
 Worthington Pump & Machinery Corp., Worthington Ave., Harrison, N. J.  
 Wrought Washer Mfg. Co., 2227 South Bay St., Milwaukee, Wis.

## X

- XL Refrigerating Co., Inc., 1834 W. 59th St., Chicago, Ill.  
 • XXth Century Heating & Ventilating Co., Ira & Edison Ave., Akron, O.

## Y

- Yardly Screen & Weather Strip Co., 142 Parsons Ave., Columbus, O.  
 Yeomans Bros. Co., 1433 Dayton St., Chicago, Ill.  
 Yoder Co., 5500 Walworth Ave., Cleveland, O.  
 York Corrugating Co., Adams St. & WM RR., York, Pa.  
 York Ice Machinery Corp., Roosevelt Ave., York, Pa.  
 York Oil Burner Co., Inc., Jessop Blace & P. R. R., York, Pa.  
 Young & Bertke Co., 1004-1014 Hulbert Ave., Cincinnati, O.  
 Young Radiator Co., 709 Mead St., Racine, Wis.  
 • Young Regulator Co., 4500 Euclid Ave., Cleveland, O.  
 Youngstown Pressed Steel Co., Warren, O.  
 • Youngstown Sheet & Tube Co., Stambaugh Bldg., Youngstown, O.

## Z

- Zapon-Brevolite Division Atlas Powder Co., North Chicago, Ill.  
 Zeh & Hahnemann Co., 182-200 Vanderpool St., Newark, N. J.  
 Zenith Electric Company, Inc., 607 S. Dearborn St., Chicago, Ill.  
 Zonolite Corp. of Montana, 5905 Second Blvd., Detroit, Mich.



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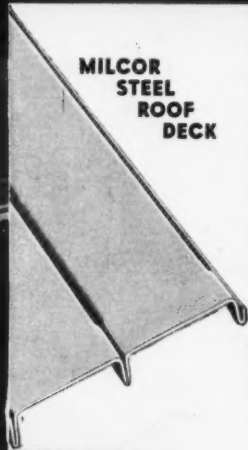
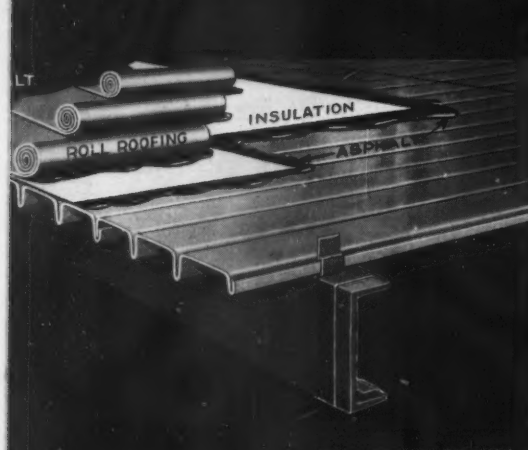
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 Chicago, Ill.      Kansas City, Mo.      CANTON, La Crosse, Wis.

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